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ENHANCING POLICY FORMULATIONS AND  
IMPLEMENTATIONS TOWARDS SUCCESSFUL  
CLIMATE CHANGE MITIGATION AND ADAPTATION  
IN SRI LANKA

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Sinhala Pathiranage Miyami Dasandara

(218023A)

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Department of Building Economics  
Faculty of Architecture

6942023  
69(043)

University of Moratuwa  
Sri Lanka

University of Moratuwa



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## DEDICATION

*I dedicate this piece of research to my beloved  
family*

## ACKNOWLEDGEMENT

The successful completion of this work is not a single attempt that was taken by me. Therefore, I make this an opportunity to express my sincere gratitude to each and every individual who encouraged and supported me during my MSc journey.

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## ABSTRACT

### **Enhancing Policy Formulations and Implementations towards Successful Climate Change Mitigation and Adaptation in Sri Lanka**

In recent decades, climate change has become an alarming issue all over the world where it can be regarded as one of the greatest challenges facing humanity in this century. To date, the impacts of climate change are getting worse day by day, posing an existential threat towards economic developments, human well-being and ecosystem functions. Hence, climate change mitigation and adaptation play a pivotal role in coping with these adverse impacts of climate change in any country. In Sri Lanka as well, the same situation can be observed where different climate change policies and plans are available focusing on climate change mitigation and adaptation to address the prevailing climate change challenges. However, an increased occurrence of potential barriers can be identified during the policy formulation and implementation activities, making them less effective in performance. Hence, the need of further strengthening the climate change policy network within the country has been felt for some time. It is, therefore, this study aimed at contributing towards enhancing the policy formulations and implementations towards climate change mitigation and adaptation in Sri Lanka.

Initially, an extensive review of literature on the research area was carried out. Subsequently, the data was collected through in-depth interviews and a document review. The collected data was analysed using code-based content analysis supported by Nvivo software. The empirical findings revealed that Sri Lanka is currently experiencing a number of climate change challenges economically, socially and environmentally. Altogether, 18 economic, social and environmental climate change challenges were captured. Hence, the successful formulation and implementation of climate change policies and plans towards climate change mitigation and adaptation were indispensable. To this, an in-depth exploration was carried out to identify the barriers and their root causes that hinder the successful formulation and implementation of climate change policies and plans in Sri Lanka. Those barriers and their root causes were captured under six (06) main categories as economic, institutional, informational, technological, social and other barriers. Institutional level challenges were captured as the topmost challenges to be addressed within the current context. Accordingly, 18 barriers were explored with their root causes and thereby the necessity of overcoming them was highlighted to make the climate change policy making and implementation activities stronger. In consequence, different strategies were proposed through the empirical findings in order to overcome the identified barriers. At the same time, a critical exploration of climate change policies and plans available within the country was carried out to gain a broader understanding of the current climate change policy network in Sri Lanka. Thereafter, the identified barriers were related to the reviewed policies and plans to see how these barriers can occur when implementing the existing ones, revising them and formulating new policies and plans based on the existing ones. The study provides a far-reaching understanding for the industry practitioners to contribute to enhancing the climate change policy formulation and implementation activities in Sri Lanka by integrating different knowledge bases derived through the findings.

**Keywords:** Climate change challenges, Climate change mitigation and adaptation, Policy formulations and implementations, Barriers

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## LIST OF ABBREVIATIONS

|       |                                              |
|-------|----------------------------------------------|
| CCS   | Climate Change Secretariat                   |
| CDM   | Clean Development Mechanism                  |
| DMC   | Disaster Management Centre                   |
| GDP   | Gross Domestic Product                       |
| GEF   | Global Environment Facility                  |
| GHG   | Greenhouse Gas                               |
| IEA   | International Energy Association             |
| INDCs | Intended Nationally Determined Contributions |
| IPCC  | Intergovernmental Panel on Climate Change    |
| IPS   | Institute of Policy Studies                  |
| KPIs  | Key Performance Indicators                   |
| LNG   | Liquefied Natural Gas                        |
| NAP   | National Adaptation Plan                     |
| NCCP  | National Climate Change Policy               |
| NCDM  | National Council for Disaster Management     |
| NDCs  | Nationally Determined Contributions          |
| NEAP  | National Environmental Action Plan           |
| NEP   | National Environment Policy                  |
| NGOs  | Non-Government Organisations                 |
| PPP   | Public Private Partnerships                  |
| SDGs  | Sustainable Development Goals                |
| UDA   | Urban Development Authority                  |

|        |                                                       |
|--------|-------------------------------------------------------|
| UNDP   | United Nations Development Programme                  |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WBG    | World Bank Group                                      |
| WHO    | World Health Organization                             |

## 1.1 Background

In recent decades, climate change has arisen as a growing issue all over the world by adding considerable stress to society and the environment (Intergovernmental Panel on Climate Change [IPCC], 2021; Adediji et al., 2014). As per the findings of Riedy (2016), generally, the term “climate change” refers to a change in average weather conditions on the Earth that persists over an extended period of time. As further asserted by him, anticipated changes in climate include changes in precipitation patterns, higher temperatures, and changes in the occurrence of extreme weather events such as floods, droughts, storms, etc. Indeed, a number of devastating impacts can incur on community structures and ecosystem functions due to this climate change (Piao et al., 2019). Although climate can be changed due to natural forces as well as human-driven forces, most recently, human activities have become a significant contributor to these climate change issues (Chausson et al., 2020). Adding to this, they further divulged that the emission of greenhouse gases through many human activities like burning fossil fuels, livestock farming and cutting and burning forests can be identified as the primary causes for climate change. To date, with the rapid developments that have taken place in the world, these human-driven causes have been largely increased and in consequence, the impacts of climate change are getting worse day by day (Butler, 2018). For instance, the precipitation patterns have become more intense and frequent today in many regions of the world leading to severe flood events while the temperature levels are considerably rising leading to prolonged droughts and heatwaves (Adediji et al., 2014). Added to this, the sea level has been rising over the past few years and the rate has been increased largely today (Lindsey, 2017).

As a result of these adverse changes in climate, the whole world is severely suffering from a wide variety of challenges (Alves & Iruretagoyena, 2022). As disclosed by Feulner (2017), a significant threat has been created on global food, water and energy security, population growth, peoples’ living patterns, agriculture, marine activities, aquaculture etc. due to global climate change. For instance, the agricultural activities

in the majority of the countries in the world are critically impacted by climate change leading to less crop productivity and thereby the food production of the whole world has been crucially impacted (Masud et al., 2017). As further deduced by them, climate change has become a major reason for the increase of poverty as well within the world. Furthermore, a number of economic losses can be seen largely in different sectors such as industrial activities, marine activities, energy productions etc. due to the acute impacts of climate change, as per Wilbanks et al. (2008). Not only that, the environment is also severely suffering from a number of challenges posed by climate change resulting in many negative impacts towards human lives, the existence of the species and developments of the world, as affirmed by European Commission (2021). Accordingly, it is evident that these climate change impacts are having adverse and far-reaching consequences on human wellbeing, national economies and the environment in many ways and will continue for decades to millennia.

In this context, climate change mitigation and adaptation have been acknowledged as the best methods to address the aforementioned challenges. Climate change mitigation mainly refers to altering the proximate causes for climate change directly or indirectly to limit the extent of climate change (Qi & Terton, 2022) while climate change adaptation refers to making adjustments by social, economic, and ecological systems in order to reduce their vulnerability to climate change challenges, as per Mertz et al. (2009). To date, a large number of initiatives have been undertaken today across different countries within the context of climate change mitigation and adaptation to formulate and implement different policies and plans with the intention of combatting the prevailing climate change challenges (Lesnikowski et al., 2020). The Paris Agreement adopted to reduce global warming, and the Sendai Framework for Disaster Risk Reduction adopted to enhance the resilience of the poor and vulnerable communities for climate change can be regarded as the major examples of such policy practices (Butler, 2018; Kelman, 2015). Further, different target plans, strategies and frameworks have also been formulated and implemented within the global context in order to reduce the vulnerability for climate change and enhance resilience (European Commission, 2021). Accordingly, many global efforts to formulate and execute different policies and plans to cope with the increased occurrence of climate change

can be identified. Although such a number of policies and plans have been initiated and implemented all over the world, an increased occurrence of potential barriers can be identified hampering the policy formulation and implementation activities (Zhao et al., 2018). In general, inadequate finance for climate actions, lack of public awareness in this regard, ineffective institutional support, government failures, lack of technological support etc. can be regarded as some of the main examples for such barriers to formulate and implement climate change policies and plans (Gonzalez-Hernandez et al., 2019; Masud et al. 2017; Watkiss & Cimato, 2018). These barriers may lead to a number of policy failures in many ways. Thereby climate action implementations towards climate change mitigation and adaptation within the countries have been interrupted significantly.

When it comes to the Sri Lankan context, the situation is almost the same, where the country is severely suffering from a number of climate change challenges (Baba, 2010). To date, a number of adverse impacts of climate change can be identified in Sri Lanka such as floods, droughts, landslides, cyclones, sea-level rise, coastal erosion, etc., which have resulted in enormous challenges (Selvachandran, 2021). It was further strengthened through the study by World Bank Group [WBG] (2020) asserting that a spillover effect has occurred in the economy, communities, and natural environment of the country due to climate change. Therefore, many institutional actions have been undertaken within the country to formulate and execute different types of policies and plans which consists of different adaptation and mitigation responses for climate change (Hewawasam & Matsui, 2019). Nationally Determined Contributions (NDCs), National Climate Change Policy of Sri Lanka, Clean Development Mechanism (CDM) policy, National Adaptation Plan (NAP) and National Environment Policy (NEP) can be identified as some examples of such policies and plans enacted towards climate change mitigation and adaptation in Sri Lanka (Hewawasam & Matsui, 2019; Eriyagama & Smakhtin, 2010). However, being still a developing country, Sri Lanka is currently experiencing a number of barriers to formulate and implement these climate change policies and plans in many ways such as economically, socially, institutionally, technologically etc. (Esham and Garforth, 2013; Masud et al., 2017). In general, lack of finance, lack of understanding of the people and their poor

perceptions on the effectiveness of the policy implementations, inadequate institutional coordination, lack of information on climate-related issues within the country, and lack of technical knowledge for policy executions etc. can be identified as some examples for such barriers (Esham and Garforth, 2013; Mahanama et al., 2014).

At present, most of the developed countries like European regions, American States etc. are often depicted as the countries, which have formulated and practiced well-established policies and plans in order to cope with prevailing as well as expected climate change challenges (Hewawasam & Matsui, 2019). Even so, as noted by Yamane (2009), many of the developing countries are portrayed as the countries with somewhat ineffective and weak policy formulations and implementations due to the prevalent barriers during the processes. Thus, the necessity of strengthening the climate change policy formulations and implementations in developing countries is predominantly vital since they are extremely vulnerable to climate change challenges, as per Watkiss & Cimato (2018). To do that, the understanding of those countries in this regard needs to be further enhanced and the tendency to overcome the existing barriers in policy formulation and implementation activities needs to be further improved.

## **1.2 Problem statement**

Sri Lanka is often regarded as a predominantly vulnerable country to climate change, where the country's climate has been already changed than past (Eriyagama & Smakhtin, 2010). As indicated by Cho (2020), in 2018, Sri Lanka was identified as one of the countries, which was most affected by climate change. Being an island state, Sri Lanka is highly susceptible to many impacts of climate change including changes in precipitation patterns, temperature levels, the occurrence of adverse weather events etc. (Selvachandran, 2021). Many challenges that have arisen from these climate-related issues are projected to continue through this century and beyond in many ways, especially economically, socially, and environmentally (WBG, 2020). On this premise, climate change adaptation and mitigation have become the most appropriate ways to restrain these climate change challenges in Sri Lanka. According to Yamane

(2009), many efforts have been made to limit the causes for climate change through mitigation strategies and to make the adjustments for continuously occurring climate change by enhancing resilience through adaptation responses within the country. Within this context, many policies and plans have been formulated and enacted towards climate change mitigation as well as adaptation within the country with the collaborative involvement of the government and many other parties (Hewawasam & Matsui, 2019). In so doing, the country is making an effort to withstand prevailing and expected climate change challenges that adversely affect the livelihoods, human health, national economy, and natural environment of the country. However, at present, a number of barriers can be identified, when formulating and implementing these climate change policies and plans. Those barriers have created many obstacles during the policy formulation and implementation activities by reducing the adaptive capacity of the country and increasing the vulnerability of communities, sectors and areas (Climate Change Secretariat, 2016). Hence, there is an emerging necessity to identify appropriate solutions to mitigate the barriers in policy formulation and implementations in Sri Lanka with the intention of ensuring the effectiveness of the policy network within the country and thereby attaining a climate-resilient future.

Although the studies on climate change challenges, climate change adaptation and mitigation are abundant, the studies on the way of achieving climate change mitigation and adaptation through effective policy formulations and implementations are notably absent. Indeed, many studies have repeatedly emphasised the need of strengthening the policy formulation and implementation processes in Sri Lanka by overcoming the existing barriers to cope with many devastating impacts of climate-related issues (Wijenayake & Mombauer, 2019; Hettiarachchi et al., 2014; Hewawasam & Matsui, 2019). Therefore, investigating the prevailing barriers to formulate and implement different climate change policies and plans is significantly vital in order to strengthen the country's policy network towards climate change mitigation and adaptation. It is therefore, the study intends to enhance the climate change policy formulation and implementation activities in Sri Lanka by identifying the existing barriers with them and proposing appropriate strategies to overcome the barriers with the intention of attaining a climate-resilient future.

### **1.3 Aim and objectives**

The aim of this study is to contribute towards enhancing the policy formulations and implementations towards climate change mitigation and adaptation in Sri Lanka. To accomplish that aim, the following objectives are formulated.

1. To identify the challenges posed by climate change impacts globally and with reference to Sri Lanka
2. To investigate the available policies and plans to fuel the climate change mitigation and adaptation in Sri Lanka
3. To investigate the barriers and their root causes in formulating and implementing climate change policies and plans in Sri Lanka
4. To determine the strategies to overcome the barriers to enhance the climate change policy formulations and implementations in Sri Lanka

### **1.4 Scope and limitations**

The study was limited to the Sri Lankan context to investigate the climate change challenges, different policies and plans available in this regard and barriers and their root causes to formulate and implement those policies and plans. Further, when exploring the different policies and plans available with regard to climate change matters, only seven (07) policies and plans which directly focus on climate change considerations and 11 policies and plans which indirectly focus on climate change considerations were selected based on the findings from the literature review and in-depth interviews.

### **1.5 Methodology**

The study intended to enhance the policy formulation and implementation activities in Sri Lanka by identifying the existing climate change challenges posed by climate change impacts as well as prevailing barriers to formulate and implement different policies and plans to overcome those challenges. Accordingly, the study was in need of exploring views and opinions of the people who are engaging in policy formulation and implementation activities within the country in an in-depth manner. Since the

study valued a socially constructed reality by exploring subjective and attitudinal information from the respondents and the researcher necessitated to be a part of the study in achieving the ultimate aim, the study was carried out by following interpretivist philosophical stance. Furthermore, the abductive research approach was adopted as the most suited research approach for the study while qualitative research choice was followed as the most preferred research choice based on the necessity of gaining a deeper insight on the research area.

As the initial step of the study, an extensive review of the literature was carried out in order to gain a theoretical understanding of the research area. In doing so, the researcher was able to identify the challenges posed by adverse impacts of climate change (Objective 1), different policies and plans in this regard (Objective 2), barriers to formulate and implement those policies and plans (Objective 3) and strategies to overcome the barriers (Objective 4) from global context to Sri Lankan context by achieving all four objectives of the study partially. When it comes to the data collection stage, it was conducted in two stages. In-depth interviews were conducted with the people who are involved in climate change policy making and implementation activities in Sri Lanka to identify the climate change challenges (Objective 1), different policies and plans in this regard (Objective 2), barriers and their root causes to formulate and implement those policies and plans (Objective 3) and strategies to overcome the barriers (Objective 4) in relation to the context of Sri Lanka. Accordingly, thirteen semi-structured interviews were conducted. In addition, a documentary review was conducted to further investigate the climate change policies and plans available in Sri Lanka and the interconnections of them with each other as well as international initiatives (Objective 2) prior to considering the barriers and the root causes related to those policies and plans. Finally, the collected data were analysed using code-based or conceptual content analysis method supported by Nvivo software package. Thereby, conclusions and recommendations were derived from the empirical findings of the study at last.

## **1.6Chapter breakdown**

The entire study was structured under six (06) main chapters as detailed below.

### **Chapter 01 – Introduction**

Chapter 01 identified the research gap to be filled through this study and provided an introduction to the study along with a background study, problem statement, aim and objectives, scope and limitations and structure of the study.

### **Chapter 02 – Research methodology**

Chapter 02 detailed the research method adopted in this study to answer the research question. Accordingly, research philosophy, research approach, methodological choice, research strategy, time horizon, data collection and data analysis techniques were discussed in length.

### **Chapter 03 – Literature Review**

This chapter reviewed prevailing literature in an exhaustive manner to get a theoretical understanding of the research area. Accordingly, an extensive traditional literature review was carried out in this study by referring a number of journal articles, conference proceedings, reports, books and other publications.

### **Chapter 04 – Data Collection and Analysis**

This chapter detailed the data collection processes conducted in this study through in-depth interviews and the documentary review. The collected data was analysed using qualitative content analysis method supported by Nvivo software package.

### **Chapter 05 – Research Findings and Discussion**

The key outcomes of the study were outlined in this chapter and a discussion was carried out on the research findings by revisiting the key literature findings of the study.

## **Chapter 06 – Conclusions and Recommendations**

This chapter presented the conclusions derived through the empirical findings of the study while describing the contribution of the study to both theory and practice. Recommendations for future research studies were also presented.

### **1.7Chapter summary**

This chapter outlined the background to the study, problem statement, aim and objectives, and scope and limitations of the study. Added to this, the research methodology followed in this study to answer the research problem was presented in brief. Finally, the chapter breakdown of the study was unveiled.

## **2. RESEARCH METHODOLOGY**

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### **2.1 Introduction**

Research methodology can be identified as a set of systematic techniques used in research to accomplish its aim and objectives (Igwenagu, 2016). More succinctly, it encompasses the way in which a research is conducted by answering the research problem. Accordingly, this chapter elaborates the research procedure followed by the researcher in length to accomplish the aim and objectives of the study in a way of discussion. Starting from the research philosophy, research approach, research choice, research strategy, and research techniques adopted in this study to achieve the aim is outlined in this chapter with proper justifications.

### **2.2 Research process**

The research process enables to conduct a research study systematically in accordance with a proper plan (Arthur & Hancock, 2009). It consists of a series of actions that need to be carried out by the researcher to achieve the aim of the study. Accordingly, Figure 2.1 presents the graphical representation of the research process followed in this study. At the initial stage, a background study was conducted in order to identify the research problem to be answered through this study. Then, a comprehensive literature review was conducted to get a theoretical understanding of the research area by achieving all four objectives partially. Data collection was carried out in two steps as in-depth interviews and document review. Thereby, data analysis was conducted under two main stages namely analysis of in-depth interviews and analysis of document review. Accordingly, analysing the in-depth interview findings contributed to achieve all four objectives while analysing the findings of document review contributed to accomplish the second objective which is to identify the available policies to fuel the climate change mitigation and adaptation in Sri Lanka. Ultimately, conclusions and recommendations were derived through the empirical findings.

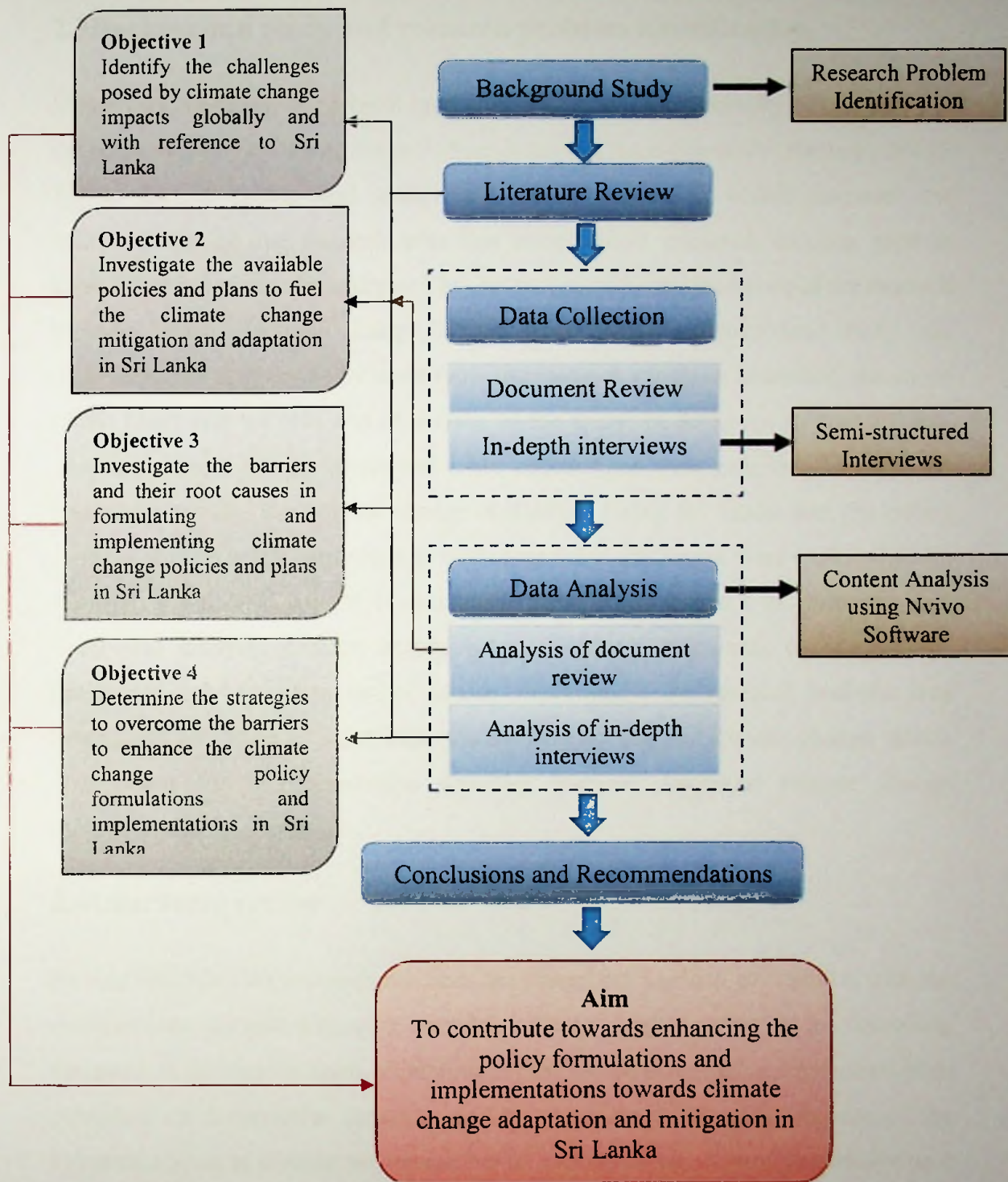


Figure 2.1: Research Process

## **2.3 Background study and research problem identification**

Identifying the research problem motivates and guides the necessity of carrying out the research study by laying the main foundation for the entire study (Pardede, 2018). To do that, a background study needs to be conducted which discusses the interpretations on the research area that prior studies explored, existing gaps in knowledge that need to be addressed by the current study and the nature of the research problem being examined (Lango, 2020). Accordingly, a background study was undertaken in Chapter one by identifying the research gap to be addressed, the scope of the study and the aim and objectives of the study. In doing so, journal articles, conference proceedings, books and other publications were referred. Through the background study, the climate change challenges facing Sri Lanka and the policy formulation and implementations to overcome those challenges were explored while identifying the necessity of investigating the specific barriers to formulate and implement different climate change policies and plans towards climate change mitigation and adaptation in Sri Lanka. Accordingly, the research problem was established as “How to contribute towards enhancing the climate change policy formulation and implementation activities towards successful climate change mitigation and adaptation?”.

## **2.4 Literature review**

Having identified the research problem, the researcher needs to get familiar with the research area and gain a broad theoretical understanding by reviewing the prevailing literature. In its simplest form, a literature review can be identified as what others have published on a particular research area (Mudavanhu, 2017). The purpose of the literature review is to assist any researcher to understand the existing knowledge on a research area before shaping the argument or justification in the proposed study (Arshed & Danson, 2015). According to Rudestam and Newton (2007), a literature review mainly extracts and synthesises different findings, issues, main points and research methods that emerged through a critical review of readings. In general, two dominant types of literature review can be identified as traditional or narrative, and systematic literature reviews (Arshed & Danson, 2015). As further disclosed by them,



narrative or traditional literature reviews focus to critically appraise the relevant literature on a particular research area while systematic literature reviews focus to undertake more rigorous way of reviewing literature according to a clearly defined and systematic approach.

Since the traditional or narrative literature reviews offer a new or expansive understanding of a subject matter and are intended for the topics where an extensive review of literature is needed (Rozas & Klein, 2010), the current study utilised an extensive traditional literature review. Through the literature review, current climate change challenges facing Sri Lanka, policies and plans available for climate change mitigation and adaptation, barriers to execute and implement those policies and plans and strategies to overcome them were investigated in a detailed manner.

## **2.5 Research methodological design**

The research methodological design can be identified as the basic structure of the research which holds all the elements of the research study together to accomplish the research aim (Akhtar, 2016). Since it determines the way of conducting the research step by step, developing the research design can be regarded as a very significant decision to be taken by the researcher. The research onion model proposed by Saunders et al. (2019) can be regarded as the most practiced choice of research design by the researchers to establish their research methodological design. It provides an exhaustive description of several stages that need to be accomplished when formulating an effective research methodology where those stages are presented as different layers of the onion (Melnikovas, 2018). The research onion model is presented in Figure 2.2.

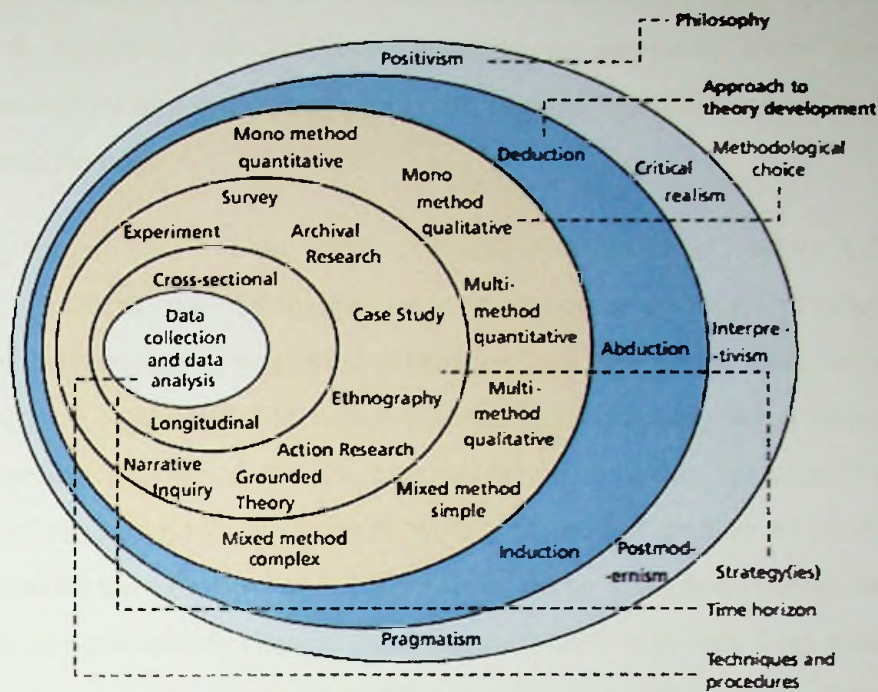


Figure 2.2: Research Onion Model

According to the research onion model, research design mainly consists of appropriate selection of research philosophy, research approach, research choice, research strategy, time horizon and research techniques. When formulating an effective research methodology, the researcher needs to pass these stages step by step. Accordingly, the below sub-sections discuss the methodological design pertaining to this study in accordance with the layers of research onion.

## 2.6 Research philosophy

Research philosophy can be identified as the first layer of the research onion and is the most important one to be considered. Agreeing with this view, Zefeiti and Mohamad (2015) stated that failure to adhere to an appropriate philosophical stance can negatively affect the quality of the research. The selection of the research philosophy for a study mainly depends on the knowledge being investigated, as noted by Chege and Otieno (2020). According to Saunders et al. (2019), research philosophy mainly refers to a system of beliefs and assumptions on the development of knowledge in a particular area of research. To understand the research philosophical stance of a study,

three major assumptions can be identified as epistemology, ontology and axiology (Zefeiti & Mohamad, 2015). These assumptions inevitably shape the way the researcher understands the research problem, uses the research methods and interprets the research findings.

**Ontology** mainly concerns the nature of reality (Saunders et al., 2019). According to Pryce et al. (2014), the ontological assumption can be discussed in relation to the beliefs on the existence of some kind of universal and objectivity. Thus, two main ends of ontology can be identified as realism and idealism. As mentioned by Hays and Singh (2012), realism is a belief that the external world is having universal truths about reality that can be known while idealism is a belief that there is no pre-determined truth owned by the external world where it should be understood within the contexts the people are embedded. Thus, in idealism, the reality may vary from place to place over a time span. In the current study, the identification of barriers to climate change policy formulation and implementation activities towards climate change mitigation and adaptation is directly associated with different views and perceptions of the people who are involving these activities. Further, to propose strategies to overcome the identified barriers and thereby enhancing climate change policy network within the country, the realism would not be suitable. Thus, this study was skewed to the idealistic nature in ontological assumption since the study acknowledged human interactions.

**Epistemology** refers to assumptions on valid, acceptable and legitimate knowledge and how the knowledge can be communicated to others (Burrell & Morgan, 2017). Two extremes can be identified in epistemology assumption as well. One extreme suggests that the knowledge is observable and evidence-based, enhancing objectivity while the other extreme suggests that the knowledge is based on the opinions of the people, encouraging subjectivity (Saunders et al., 2009). Accordingly, since the current study considered the opinions of the people who are engaging in climate change policy formulation and implementations to identify the climate change challenges, available policies and plans in this regard, and barriers to formulate and implement them, subjectivity was highlighted in the epistemological stance.

**Axiology** refers to a set of values and ethics throughout the research process, where it questions the way researchers are dealing with their own values and ethics as well as with the research participants (Saunders et al., 2019). More concisely, the axiology assumption is directly associated with the value concern of the study. According to Lewthwaite and Nind (2016), a study may be either value-laden or value-free. In a value-free study, the choice of what to study and how to study is determined by objective criteria while it is determined by human values and experiences in a value-laden study (Easterby-Smith et al., 2018). Accordingly, since the researcher requires people to come with different views and values to investigate the research area by being a part of the study, it took value-laden stance.

Based on the aforementioned philosophical assumptions, each assumption has different philosophies attached to them, namely positivism, interpretivism and pragmatism (Zefeiti & Mohamad, 2015). **Positivism** has the ontological assumption of the belief that the external world is having universal truths about reality which is known as “realism”. At the same time, it is associated with the epistemological assumption which indicates that reality needs to be measured objectively rather than subjectively (Easterby-Smith et al., 2018). Moreover, positivists are allied to the axiological assumption of value-free which believes that the observes must be independent of what to study and how to study. Hence, the researcher would detach from what is researched without interfering with the research environment and being biased to the results of the study. In brief, positivism relates to the philosophical stance of true reality which entails working with observable facts by being independent from the research environment (Saunders et al., 2019).

**Interpretivism** developed as a critique of positivism. Thus, conversely, interpretivism mainly relates to the ontological assumption that there is no pre-determined truth owned by the external world which is identified as “idealism” (Dudovskiy, 2022). Epistemologically, interpretivists believe that reality is measured through subjective measures by considering the opinions and perceptions of the people. Hence, interpretivism argues that human beings cannot be separated from the knowledge being investigated (Saunders et al., 2019). Further, it enables the researcher to maintain

close interactions with the research. Accordingly, the researcher is a part of what is researched unlike in the positivist studies, therefore, interpretivism follows value-laden approach in terms of axiology (Easterby-Smith et al., 2018). Overall, interpretivism relates to socially constructed and subjective reality where the researcher's interpretations are key by being a part of the study (Saunders et al., 2019).

**Pragmatism** is a research paradigm that is based on the possible assumptions to adapt both positivism and interpretivism whichever works best for the particular study (Melnikovas, 2018). It basically provides an underlying philosophical framework for the research studies followed by mixed methods (Kaushik & Walsh, 2019). Pragmatists ontologically in the view that whilst there is a pre-defined truth existing in the world, it can be based upon the views of the individuals as well. When it comes to the epistemological viewpoint, both objective and subjective points of view were adopted in pragmatism. That means pragmatists may have a significant variation in terms of how objective and subjective the research outcome turns out to be (Saunders et al., 2019). At the same time, in the axiological point of view, pragmatist studies are researcher reflexive where the study is initiated and sustained by the doubts and beliefs of the researcher.

As set out in aim and objectives, the current study is expected to explore different views of the respondents to identify climate change challenges, different climate change policies and plans available, and barriers to implement them. Further, the study needed to propose appropriate strategies to overcome the identified barriers by enhancing the climate change policy formulation and implementation activities within the country. In this context, it can be seen that the current study valued and encouraged the socially constructed reality which depends on subjective measurements as per the views of the respondents. Therefore, interpretivism can be regarded as the most preferred research philosophy for this study.

## **2.7 Approach to theory development**

This is the second layer of Saunderson's research onion model. Many arguments have occurred when it comes to the choice of research approach for scientific studies. Thus,

researchers are confronted with the dilemma of selecting the most suitable research approach for their studies. According to Saunders et al. (2019), three (03) main research approaches to theory development can be identified as inductive, deductive and abductive. In the inductive approach which is informally called as “bottom-up”, the research study starts from collecting data in order to explore a phenomenon by allowing a theory to be emerged (Soiferman, 2010). More concisely, inductive reasoning means moving from specific observations to the broader development of theories. Conversely, the deductive approach which is informally called as “top-down”, starts with theory followed by developing an empirical observation to test the theory (Park et al., 2020). That means it works from more general to more specific. The Abductive approach mainly entails both inductive and deductive approaches where the researcher collects data to explore a phenomenon to build a new theory or modify an existing theory which is subsequently tested through additional data collection (Saunders et al., 2019). Mainly it has been emerged to address the weaknesses in the other two approaches. When it comes to the current study, it initially considered some pre-established theories or knowledge with regard to climate change and its policy perspective. Thereafter, the identified theories and knowledge were further improved or modified where different barriers and their root causes to formulate and implement different climate change policies and plans were explored in relation to the Sri Lankan context through additional data collection. Accordingly, it can be seen that the study has acknowledged the features of both inductive and deductive approaches. Hence, the abductive approach was identified as the most suited research approach for this study.

## **2.8 Methodological choice**

The methodological choice is the third layer of the research onion model. It defines the selection among qualitative, quantitative and mixed methods for the research study. When it comes to the quantitative approach, it mainly deals with factual and numerical data and uses mathematical operations in order to analyse the findings of the study (Walliman, 2011). By further strengthening this Kumar (2019) disclosed that the quantitative approach follows a rigid procedure to determine the extent of a

phenomenon based on more accurate and high-quality data from a wide sample, communicating them in an analytical and aggregate manner. The quantitative approach would be more suited for the research studies, which initiate the research question with 'what', 'where', 'who', 'how much' and 'how many' (Apuke, 2017). In qualitative approach, an in-depth exploration of the subject area is undertaken by analysing respondents' experiences, attitudes and behaviours (Kyngas, 2020; Fellows & Liu, 2015). The same idea was brought forward by Yin (2011) as well, stating that the qualitative approach can be used to represent the views and perspectives of a specific group of people. In general, qualitative research deals with some specific data like words other than numerical (Busetto et al., 2020). Accordingly, the qualitative approach would be more appropriate for the research studies in which the research question starts with 'how' and 'why' (Yin, 2011). In mixed research approach, both qualitative and quantitative approaches are used by avoiding the negative points of the two approaches (Doyle et al., 2009). It assists the researcher to gain a clearer picture of the research study than using a standalone qualitative or quantitative approach since it incorporates the benefits of both methods (Schoonenboom & Johnson, 2017).

The current study intends to enhance the climate change policy formulation and implementation activities by identifying the prevailing barriers and their root causes in Sri Lanka. In order to pursue the research aim, an exhaustive analysis was highly needed to investigate the climate change challenges in Sri Lanka, available policies and plans in this regard, barriers and their root causes to formulate and implement them as well as to propose strategies to overcome the barriers. In doing so, the views, knowledge and experience of the people who are engaging in climate change policy formulation and implementation activities were highly acknowledged to gain a clear picture of the research area. Hence, the qualitative research choice was adopted as the most preferred research choice for this study.

## **2.9 Research strategy**

Research strategy mainly refers to the general way of assisting the researcher to select the main data collection methods in order to answer the research question (Melnikovas, 2018). Accordingly, Saunders et al. (2019) suggested experiment, survey, case study,

archival research, ethnography, action research, grounded theory and narrative inquiry as the main research strategies to be used in research studies.

Amongst the aforementioned research strategies, the survey research strategy was adopted in this study. As stated in the study by Mathiyazhagan and Nandan (2010), a survey can be mainly identified as any procedure of systematically collecting data from a population or a sample through different forms of methods. This survey method allows the researchers to benefit from different data collection techniques including both quantitative and qualitative such as questionnaires, interviews and focus group discussions (Singleton & Straits, 2009). In general, the survey method only covers quantitative aspects that primarily intend to describe numerical distributions of variables in the sample or population (Jansen, 2010). However, a qualitative aspect of defining and investigating variations in the population also can be identified within the survey method, as further indicated by the author. Basically, qualitative surveys do not aim at establishing any numerical distribution where they focus on determining the diversity of a phenomenon within a given population. Fink (2002) also recommended the qualitative survey method for the exploration of meanings and experiences of people in a population with regard to a particular subject matter. In this context, it is evident that qualitative survey strategy can be regarded as the most suited research strategy for this study because this study intended to explore the diversity of climate change policy formulation and implementation processes in relation to the Sri Lankan context in length by capturing experience and opinions of the people who are engaging in these activities.

## **2.10 Time horizon**

This is the fifth layer of the research onion model, which describes the time frame of the research. Accordingly, having chosen the appropriate research philosophy, research approach, research choice and research strategy for the study, a decision needs to be made on whether the researcher is going to study the research area at a particular single point of time or over multiple points of time (Iovino & Tsitsianis, 2020). In this context, as per Saunders et al. (2019), two main types of time horizons can be identified namely cross-sectional and longitudinal. The cross-sectional time frame represents a

snap-shot view of the study, where the phenomenon is studied at a particular moment. These studies look at how things are now or then, rather than considering whether there is a related trend or history for the work (Bryman & Bell, 2011). When it comes to the longitudinal studies, the data are collected over a prolonged period of time and analysed the change occurred over that particular time period (Caruana et al., 2015). That means, this time frame is highly beneficial when studying changes and progressions of a phenomenon over a period of time. As articulated by Saunders et al. (2019), case studies (short-term) and surveys follow a cross-sectional time frame while ethnography, case study (long-term), action research, and archival research follow a longitudinal time frame. Accordingly, since this study investigates the current situation of climate change challenges in Sri Lanka, relevant policy formulation and implementations to address them and the existing barriers and their root causes to these policy formulations and implementations, the cross-sectional time horizon was adopted.

## **2.11 Data collection techniques**

Data collection techniques generally provide a way of gathering information systematically in order to answer the research question (Kabir, 2016). There are two main types of data as primary data and secondary data. Primary data refers to data that can be collected from first-hand-experience which are not changed or altered (Salkind, 2010). Several types of primary data collection methods can be identified as interviews, questionnaires, document reviews, observations, and focus group discussions. Secondary data mainly refers to data gathered from different sources that have been already been published such as journal papers, books, online articles, records etc. (Kabir, 2016). In general, the review of literature in any research study is based on these secondary data. Accordingly, the current study adopted several data collection techniques at several stages of the study to accomplish the research objectives as depicted in Figure 2.3.

### **Literature Review**

Traditional Literature Review: Identifying climate change challenges, climate change policies and plans available, barriers to formulate and implement climate change policies and plans, strategies to overcome the barriers

### **In-depth Interviews**

Semi-structured Interviews: Identifying the climate change challenges in Sri Lanka, climate change policies and plans available in Sri Lanka, barriers and their root causes to formulate and implement climate change policies and plans, strategies to overcome the barriers

### **Document Review**

Identifying the policies and plans which directly and indirectly focuses climate change mitigation and adaptation, interpreting the links between the available policies and plans

Figure 2.3: Data collection techniques used for the study

#### **2.11.1 Literature review**

As discussed in Section 2.4, a traditional literature review was conducted in this study in order to collect the secondary data on climate change challenges, climate change policies and plans available, barriers to formulate and implement climate change policies and plans, strategies to overcome the barriers.

#### **2.11.2 Document review**

Document review mainly refers to a systematic procedure of reviewing or evaluating both printed and electronic documents (Bowen, 2009). As further added by the author, document review is often adopted in qualitative research in a combination with other data collection methods as a means of triangulation. Like other methods in qualitative research, document reviews are also in need of examining and interpreting data to gain understanding, elicit meaning and establishing empirical knowledge, as disclosed by

(Busetto et al., 2020; Corbin & Strauss, 2008). Accordingly, this study is also benefitted from a document review that was conducted to identify different policies and plans available in Sri Lanka focusing on climate change mitigation and adaptation. During the process, several policies, and plans published by different authorities targeting climate change considerations directly as well as indirectly were separately reviewed. In consequence, the extent of the contribution of those documents from both categories towards climate change mitigation and adaptation was critically explored while further investigating the interrelationships among the reviewed documents to make the policy network of the country stronger. All the documents were electronic versions that were available online.

### **2.11.3 In-depth interviews**

In qualitative research, in-depth interviews are mostly used as the data collection technique in order to gain a deep understanding of the research area by exploring peoples' views, experiences, perspectives and beliefs in greater depth (Rutledge & Hogg, 2020). Accordingly, in-depth interviews are more interactive and thereby the researcher can expect complete and distinct answers from the respondents in their natural settings (Alshenqeeti, 2014). Therefore, in-depth interviews can be regarded as the most appropriate data collection method to accomplish the outcomes of this study in which peoples' views, experiences, and perspectives with regard to climate change policy formulations and implementations were highly valued.

In general, three (03) main categories of in-depth interviews can be identified based on their nature namely structured, semi-structured and unstructured interviews (Adhabi & Anozie, 2017). Structured interviews are fully controlled by the researcher or interviewer where pre-planned questions are asked from the respondents expecting straightforward answers (Stuckey, 2013). When it comes to semi-structured interviews, they mainly depend on how the respondents respond to the questions and have no rigid adherence unlike structured interviews (Alshenqeeti, 2014). Hence, semi-structured interviews can be identified as the most commonly used category of in-depth interviews by most qualitative researchers. Unstructured interviews are non-directive interviews where the researcher does not have pre-planned questions

therefore, these interviews are bends towards the researcher's interests (Jamshed, 2014). By considering the above facts, semi-structured interviews were adopted for the current study since the flexibility, they provide the researcher to further clarify the facts regarding the research area. Accordingly, semi-structured interviews were carried out to gather data with the people who are engaging in climate change policy formulation and implementation activities in Sri Lanka. During the process, purposive sampling method was used to identify the appropriate respondents for the study. In purposive sampling, the respondents who can and are willing to provide the information are selected based on the interest of the researcher by considering what needs to be known (Etikan et al., 2016). In brief, purposive sampling is a deliberate choice of the participants that are especially knowledgeable about or experienced with a particular phenomenon. Accordingly, the respondents for this study were selected based on their knowledge and experience in the field of climate change from the perspective of policy development. The respective personnel were interviewed until the collected data got saturated where thirteen semi-structured interviews were carried out. The profile of the interviews is presented in Table 4.3 in Section 4.3. The data were collected using a semi-structured interview guideline which was structured under five (05) main sections as presented in below.

Table 2.1: Structure of the interview guideline

| Section | Main focus                                                                                   | Reference to the research objectives |
|---------|----------------------------------------------------------------------------------------------|--------------------------------------|
| A       | Background Information                                                                       | -                                    |
| B       | Climate Change Challenges in Sri Lanka                                                       | Objective 1                          |
| C       | Climate Change Policies and Plans available in Sri Lanka                                     | Objective 2                          |
| D       | Barriers to formulate and implement climate change policies in Sri Lanka                     | Objective 3                          |
| E       | Strategies to overcome the barriers in climate change policy formulation and implementations | Objective 4                          |

The interview guideline was piloted and revised prior to conduct the in-depth interviews with the respective respondents in order to ensure that whether the interview

guideline is well-structured to acquire the answers at an expected level by satisfying the objectives of the study.

## **2.12 Data analysis techniques**

After collecting the data, the next step is to analyse the collected data using an appropriate data analysis method and it can be identified as one of the significant parts of any research. Mainly data analysis is carried out to reduce a large amount of data by categorising and summarising them with the purpose of making sense of them at the end of the study (Kawulich, 2004).

### **2.12.1 Qualitative content analysis method**

Multiple methods of data analysis methods can be identified for qualitative analysis such as content analysis, thematic analysis, narrative analysis, phenomenological analysis etc. as per Kawulich (2004). Among them, the content analysis method was adopted in this study because it can be identified as the most applicable, flexible as well as commonly used data analysis method which can be used to analyse textual data (Kyngas, 2020; White & Marsh, 2006). Further, since the content analysis method is highly beneficial in analysing a large amount of data, it can be regarded as the most preferred for the current study to analyse the largely gathered data through in-depth interviews.

Three (03) main approaches of qualitative content analysis can be identified namely conventional, directed, and summative content analysis (Hsieh & Shannon, 2015). When it comes to conventional content analysis, it would be more appropriate when existing theory or knowledge on a phenomenon is limited, as further discussed by the authors. When conducting conventional content analysis, the text is scrutinised to identify different concepts or themes and they are categorised into different codes (Franzosi, 2004). Accordingly, this method mainly entails the reduction of gathered data into a coding system which helps to interpret the data in a meaningful manner (Hsieh & Shannon, 2015). The main advantage of this approach is the ability to gain direct information from the respondents without imposing any pre-defined categories. Directed content analysis can be used when there is an existing theory or prior study

which is incomplete or have the potential to further improve (Hsieh & Shannon, 2015). More concisely, it is based upon an existing theory or research where initial coding categories are emerged to extend the existing theories (Stock, 2012). Therefore, it follows a more structured process than in conventional content analysis. The summative content analysis mainly refers to identifying and quantifying certain words to understand the contextual use of the words or content. It aims at exploring the underlying meanings of the words or texts where the words of the text are initially counted and compared for further interpretations (Rapport, 2010).

Since the current study mainly depends on the views and opinions of the respondents in investigating the climate change challenges, policies and plans available in this regard and barriers to formulate and implement those policies and plans to overcome the climate change challenges with reference to the Sri Lankan context, directed content analysis and summative content analysis would not be suited to accomplish the aim of the study. Therefore, the conceptual content analysis method was identified as the most preferred content analysis method for this study. During the analysis, the coding can be done either manually or using a computer-aided software. To this study, the content analysis was done using a computer-aided software. Further, when discussing and interpreting the results, direct quotations from the interview transcripts were used as the honest representation of the experience of the respondents and their influences towards the study in order to reduce the bias.

### **Use of computer aided software**

According to Humble (2012), researchers appear to be exceedingly using different qualitative data analysis software packages such as Atlas.ti, MAXQDA, NVivo and so on for their studies. Indeed, appropriate use of software packages can lead to shortening the timeframe for the analysis, providing more rigorous outcomes thorough coding and interpretation and enhance data management (Jones, 2007). When selecting the most suitable software for a study, several factors need to be considered such as the amount of data to be analysed, time availability for the researcher to learn how the software package can be used, operating system of the computer, time availability for undertaking the data analysis, research approach used for the study etc.

(Saunders et al., 2007). Accordingly, the NVivo software package developed by QSR International Pvt. Ltd. was used for this study to analyse the findings of the in-depth interviews since it was noted that the said software satisfies the researcher's data analysis requirements. The software provides multiple benefits for a research study such as the ability of accommodating a rich and large amount of data, increased transparency of the analysis, enhanced time management and so on (Dollah et al., 2017). These benefits encouraged the researcher to use the NVivo software for this study as well. The process adopted when using NVivo software can be discussed in a detailed manner as presented below.

### Data analysis steps in NVivo

As the first step, a new project was created in NVivo software as presented in Figure 2.4.

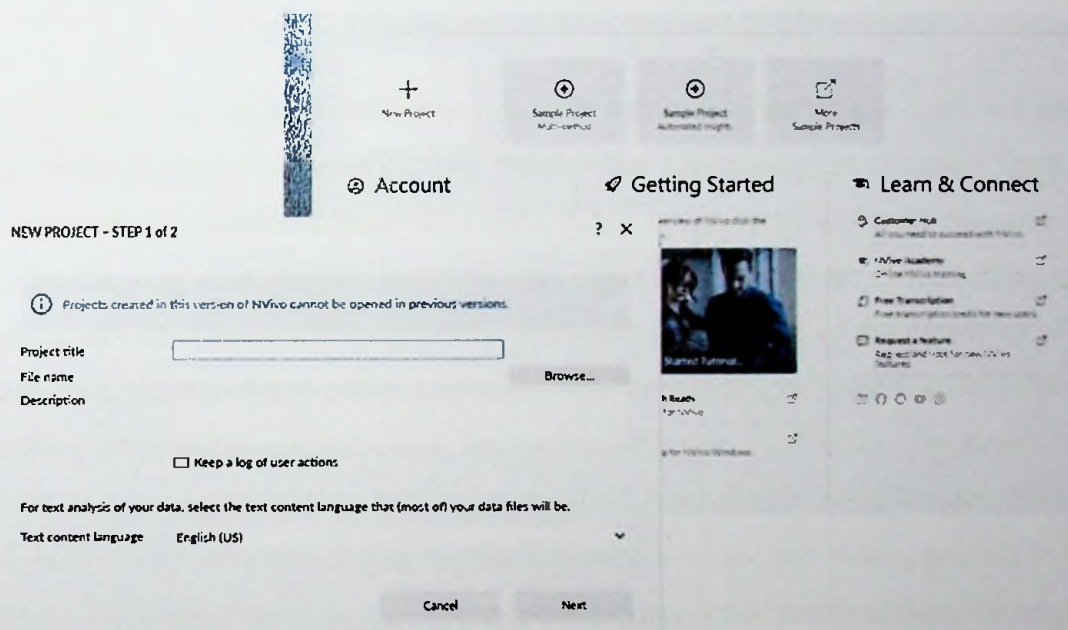


Figure 2.4: Creating a new project in NVivo software

Thereafter, the semi-structured interviews which were tape-recorded were transformed into a written format using MS Word and then the transcribed semi-structured interviews were uploaded to the software (refer Figure 2.5).



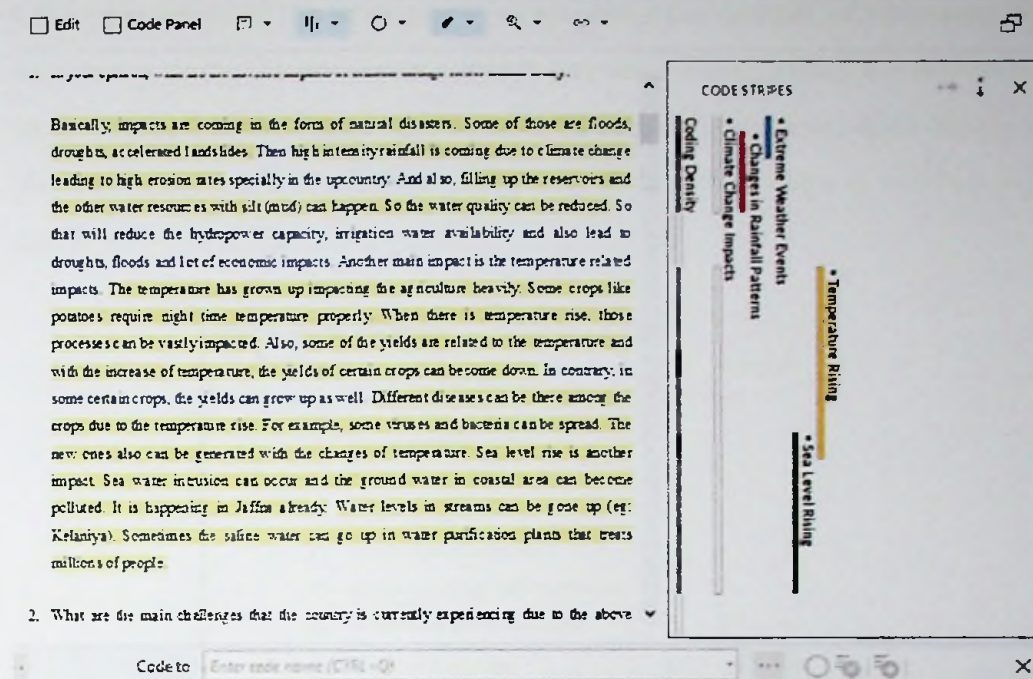


Figure 2.6: Identifying concepts and assigning codes

Thereafter, the codes created from the above process were linked to the relevant research objectives. Here, the identified codes were structured in a hierarchical manner as sub-themes under the main themes captured in relation to the research objectives. These main themes were identified as “parent codes” while the sub-themes were identified as “child codes” in the NVivo software (refer Figure 2.7).

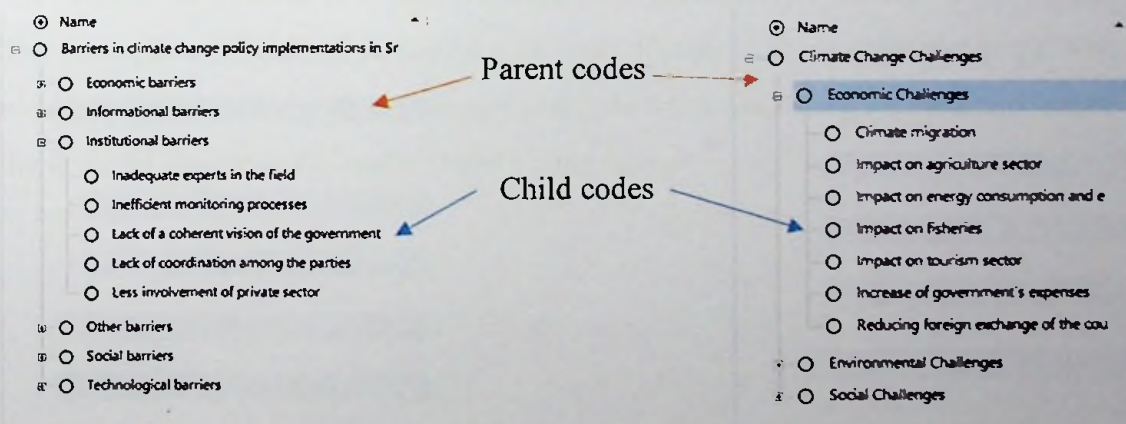
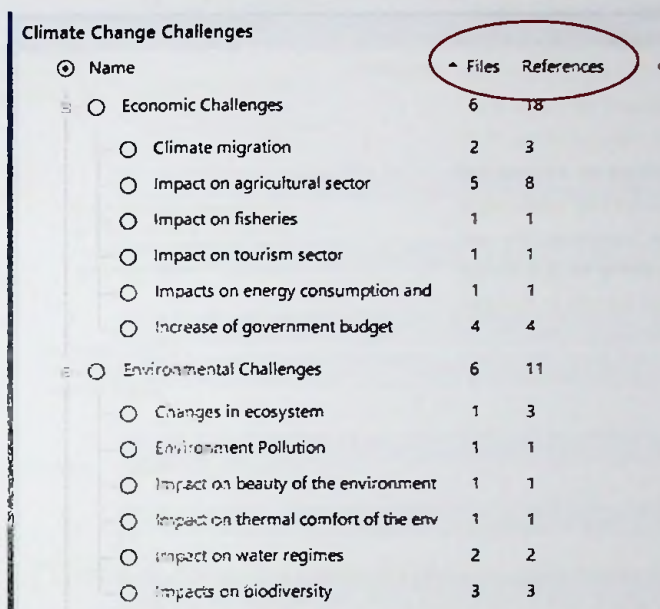


Figure 2.7: Parent codes and Child codes

These identified codes were structured with the relevant number of files and references in the NVivo software. The number of files indicates how many sources/ respondents

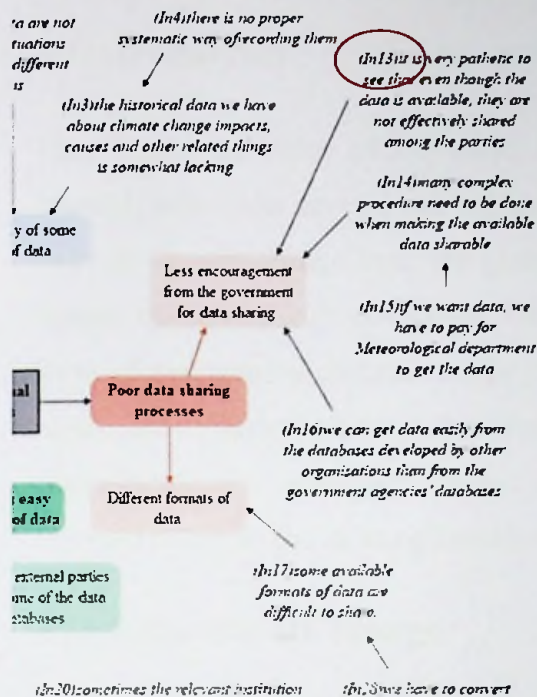
have been revealed the particular concept while the number of references indicates how many times the particular concept has been coded within the relevant sources (refer Figure 2.8). The aggregate number of files and references from the child codes also can be indicated in relation to the parent codes which helps to build up arguments and to arrive at different conclusions.



| Climate Change Challenges              |         |            |
|----------------------------------------|---------|------------|
| ⊙ Name                                 | ▲ Files | References |
| ⊖ Economic Challenges                  | 6       | 18         |
| ○ Climate migration                    | 2       | 3          |
| ○ Impact on agricultural sector        | 5       | 8          |
| ○ Impact on fisheries                  | 1       | 1          |
| ○ Impact on tourism sector             | 1       | 1          |
| ○ Impacts on energy consumption and    | 1       | 1          |
| ○ Increase of government budget        | 4       | 4          |
| ⊖ Environmental Challenges             | 6       | 11         |
| ○ Changes in ecosystem                 | 1       | 3          |
| ○ Environment Pollution                | 1       | 1          |
| ○ Impact on beauty of the environment  | 1       | 1          |
| ○ Impact on thermal comfort of the env | 1       | 1          |
| ○ Impact on water regimes              | 2       | 2          |
| ○ Impacts on biodiversity              | 3       | 3          |

Figure 2.8: Files and references of the concepts

When discussing the results derived through the Nvivo software, cognitive maps which were supported with the concepts extracted from the interview transcripts were used. The concepts were entered in the form of short phrases in these cognitive maps. The concepts were denoted with the support of a code when discussing the results, to make the findings clearer to the reader (refer Figure 2.9).



an important barrier captured by the respondents in this category is “poor data sharing processes”. R2 added that “It is very pathetic to see that even though the data is available, they are not effectively shared among the parties” (In13). In fact, the government does not encourage data sharing among the parties and it can be considered as one of the major issues in this regard. R1 commented that “...we have to do many complex procedures like some agreements and contracts when making the data sharable” (In14). Added to this, as disclosed by R6, the necessity to spend some money for Meteorological department to get their data can also be cited as another example for this situation (In15). Supporting this view, R7 stated that “We can get data easily from the databases developed by NGOs, organisations like International Water Management Institute, World Bank etc. from the government agencies’ databases” (In16). Accordingly, less encouragement from the government for data sharing has been created a significant barrier which leads to poor data sharing processes. In fact, this situation is mainly due

Figure 2.9: Assigning codes for the concepts when discussing the results

## 2.13 Chapter summary

This chapter outlined the research methodology adopted in this study in a way of detailed discussion with proper justifications. Accordingly, under the qualitative research approach, qualitative survey strategy was used in this study in order to gain an in-depth understanding of the climate change challenges, policies and plans available in this direction, barriers and their root causes to formulate and implement those policies and plans and finally to propose appropriate strategies to be performed to overcome the barriers in relation to the context of Sri Lanka. A document review and in-depth interviews were adopted as the data collection techniques where code-based content analysis method supported by Nvivo software was utilised to analyse the collected data. Ultimately, conclusions and recommendations were derived based on the empirical research findings.

#### 3.1 Introduction

This chapter provides an extensive review of prevailing literature regarding the research area under several sub-sections. Accordingly, the focus is apprehending the issue of climate change from the global context to the Sri Lankan context. Moving further, climate change challenges, climate change mitigation and adaptation as the ways of overcoming climate change challenges, different policies and plans in this regard and different barriers to formulate and implement those policies and plans were comprehensively identified. Finally, strategies to overcome those barriers were captured based on the existing knowledge.

#### 3.2 Global climate change

Climate can be identified as a complex and interactive system, which consists of the atmosphere, water bodies, land surface, and living beings etc. (Adedeji et al., 2014). The internal dynamics of the climate system can be significantly influenced by various external factors resulting in a number of changes in the system. Accordingly, Earth's climate has constantly been changing over geological time, attributing to a number of variations in weather patterns all over the world (Lindvall, 2021; Esham & Garforth, 2013). In fact, it is obvious that climate and weather are not independent terms. As per Tomlinson et al. (2020), weather can be identified as the way of the atmosphere behaving from minute-to-minute, hour-to-hour, day-to-day, and season-to-season while climate can be identified as long-term aggregation of different weather patterns. Thus, it is true that climate change directs to extreme changes in weather patterns with a lot of adverse consequences. In recent decades, climate change has become an alarming issue, which is being highly experienced by the whole world, as affirmed by Lindvall (2021). More succinctly, it can be identified as one of the greatest challenges facing humanity in this century (Swim et al., 2011). Indeed, climate change can be identified as the significant fluctuations in the prevailing state of average weather patterns on the planet that last over several decades or longer (Riedy, 2016). These

changes in climate may be due to natural internal processes within the climate system as well as anthropogenic or human-driven external forcing (Cho, 2020; Adedeji et al., 2014). The natural internal processes mainly include volcanic eruptions, solar variations, changes in land surface properties, and the earth's orbital changes, whilst anthropogenic forces including greenhouse gas emissions from many human activities such as burning fossil fuels, increasing livestock farming, large scale irrigation and the cutting and burning of forests (Chausson et al., 2020; Intergovernmental Panel on Climate Change [IPCC], 2007). However, with the rapid developments that have taken place in the world, human-driven forces have become the key reasons over the natural processes for the occurrence and acceleration of these changes in the climate today (Swim et al., 2011; Nianthi & Shaw, 2015).

According to Adedeji et al. (2014), the evidence of climate change is compelling globally, where the precipitation patterns are changing, sea levels are rising, the whole world is getting warmer day by day, and severe weather events are constantly occurring. Added to this, the long-term data relating to the fossil records, atmospheric CO<sub>2</sub> levels, and the expansion of ice, which have been discovered by scientists can also be identified as the signs of global climate change (Warm Heart Worldwide Inc. [WHW], 2020). To date, these impacts of global climate change are getting worse day by day, leading to catastrophic consequences on the ecosystems as well as on human wellbeing (Butler, 2018). The same idea was brought forward by American Psychological Association (2022) stating that these impacts will continue for many decades and therefore, climate change poses an existential threat towards human civilisation. Nowadays, precipitation events have become more intense as well as frequent in many regions of the world resulting in severe flood events, while heatwaves have been occurred more often and last longer, leading to many negative effects on the human lives and environment in many ways (Adedeji et al., 2014). Adding to this, the oceans have become warm and acidic, and the sea levels are continuing to rise. Also, in most developing countries, the agriculture sector has become more vulnerable to these climate changes resulting in many negative impacts on crop production, land usage, livelihoods etc. (Costa et al., 2020). Also, the global industrial activities, transportation, tourism and many other sectors have been largely impacted due to

climate change today. In this context, it is witnessed that the whole world is already suffering from the devastating effects of extreme weather events exacerbated by climate change.

When it comes to the Sri Lankan context, the same situation can be observed, where the country's climate has been changed constantly, leading to many devastating impacts and challenges (Eriyagama & Smakhtin, 2010). Accordingly, the next section will be the focus on changes in climate in Sri Lanka.

### **3.3 Climate change in Sri Lanka**

Although Sri Lanka is occupying a unique position in the Indian Ocean owing to its geographical location, it has become a significantly vulnerable country to climate change (De Costa, 2017). These changes in climate primarily include temperature rising, changes in precipitation patterns, sea level rising and increase of extreme weather events. As stated by Selvachandran (2021) and Eriyagama and Smakhtin (2010), in recent times, the intensity and frequency of these extreme weather events due to climate change have been increased significantly within the country triggering a large increase in natural disasters. When considering Sri Lanka, floods, landslides, prolonged droughts, coastal erosion and hazardous heatwaves can be identified as the major natural disasters, which can occur due to climate change (Climate Change Secretariat, 2016).

According to WBG (2020), Sri Lanka, being a tropical country, regularly experiences very high temperatures with an average maximum of 32°C, where this situation can amplify into hazardous heatwaves. Furthermore, nationwide droughts are experienced by Sri Lanka many times within a year as a result of these adverse increases in temperature level. According to Palamakumbure et al. (2020), Sri Lanka is mostly impacted by sea-level rise as well, resulted from these thermal expansions, leading to coastal erosion, the intrusion of salinity, and shoreline retreat as the direct consequences. In fact, the study by Han et al. (2010) strongly revealed that Sri Lanka can be identified as one of the most affected countries for coastal geoenvironmental disasters, which mainly occur due to the huge thermal expansions resulted from

climate change. Further, Palamakumbure et al. (2020) further affirmed in their study that gradual and cumulative coastal erosion can be expected in the future along with the coastal areas of the country, influencing many geomorphological features such as lagoons, coral reefs, marshlands, sandy ridges etc. largely. In addition, floods and landslides also can be identified as other extreme weather events arisen from these changes in climate each and every year (Palliyaguru & Amaratunga, 2008). These predictions are further supported by Eriyagama and Smakhtin (2010) who stated that the average rainfall in the country and the intensity of the daily rainfall are increased significantly in many times of the year, triggering a large increase in landslides as well as flood events within the country. They further asserted that a high possibility can be observed in increasing the occurrence of lightening hazards as well due to the changes in precipitation patterns in many regions of the country.

Accordingly, it is witnessed through the above discussion that many kinds of frightful weather events can occur due to climate change throughout the world. A similar situation can be observed in Sri Lanka as well. Whilst occurring these adverse impacts of climate change, the whole world is being challenged in numerous ways, which are discussed in a detailed manner in the next section.

### **3.4 Climate change challenges**

The whole world is severely suffering from a wide variety of challenges due to the prevailing climate change impacts which were discussed in the preceding section (Alves & Iruretagoyena, 2022). Accordingly, a huge threat has occurred on global food production, agriculture, water consumption patterns, population growth, peoples' living styles, marine activities, aquaculture activities, energy security etc. as a result of these adverse impacts of climate change (Feulner, 2017). When considering about agricultural sector which is inherently sensitive to climate change, crop productivity has been drastically reduced in most of the countries in the world due to climate change (Masud et al., 2017). It has been directly led to the decline of world food production as well as the increase in poverty levels of the communities largely. Also, the energy usage has been further increased in the manufacturing sector, the commercial sector as well as residential households with the acute impacts of climate change resulting in

many economic losses (Lindvall, 2021; Wilbanks et al., 2008). As affirmed by European Commission (2021), the health and wellbeing of Europeans have been significantly influenced by these climate change impacts, leading to many diseases, deaths and social inequalities. For instance, the European heatwave which has caused 2500 deaths can be regarded as the deadliest disaster in 2019. As further asserted by European Commission (2021), water resources have also been severely impacted by climate change resulting in many interruptions for economic activities including agriculture, power generation, aquaculture, marine activities and tourism. In this context, it is apparent that a number of challenges have occurred all over the world due to the climate change which is looming day by day. At the same time, according to O'Neill (2017), climate change have been led to poverty and social dislocation in the countries, where the majority of the individuals and communities mostly disadvantaged by climate change.

In Sri Lanka, the situation is not different from the global context, where enormous economic, social, and environmental challenges have been occurred due to the devastating impacts of climate change (Yamane, 2009). Accordingly, the next section will be the focus on climate change challenges facing today in Sri Lanka.

### **3.4.1 Climate change challenges in Sri Lanka**

As previously identified, many detrimental effects can incur mainly in the economy of the country, social wellbeing of the country and natural environment due to these climate-related issues in Sri Lanka. These climate change challenges are broadly visited in the next subsections separately.

#### **3.4.1.1 Economic challenges**

As disclosed by Withanachchi (2019), it is imperative to know exactly how disastrous climate change is for the economic sector of the country, since it can be identified as the backbone of the country's development. When considering the economic challenges, many areas need to be broadly explored. The agriculture sector has become one of the key sectors, which contributes to the country's economy in many ways (United Nations Development Programme [UNDP], 2017). Indeed, it approximately

contributes to 7% of the Gross Domestic Product (GDP) of the country, provides 80% of the domestic food requirement, absorbs 30% of the labour force, utilises 43% of total land area and has become livelihoods for 70% of the rural population in Sri Lanka (Withanachchi, 2019). At the same time, it is the most sensitive sector for climate change, where the agricultural production and farm assets have been significantly impacted due to the many climate-related hazards during the recent years (Gunaratne et al., 2021). In this context, it is witnessed that climate change has critically impacted the agricultural sector, leaving food production, foreign exchange, and employment at frightful risk. For example, De Costa (2010) disclosed that both rice and tea production in Sri Lanka has intimately linked with the temperature levels, where long term shifts in rainfall patterns and temperature regimes have created substantial damages on the national food security, foreign exchange and livelihoods of the people who depends on these cultivations. According to WBG (2020), many effects such as the impacts on water resource availability, soil erosion, alterations in Carbon Dioxide availability, the arrival of invasive species can also occur due to climate change, weakening agricultural productivity, heavily. At the same time, a notably high dependency of the economy on fisheries can also be identified in Sri Lanka, where the health of fisheries can prominently be influenced by climate change (WBG, 2020; Arulananthan, 2017). Rising temperatures and ocean acidification resulted from climate change have created a significant impact on the fisheries, weakening many areas of the economy. Indeed, it is evident that fishery stocks, fisheries habitats, fishery stock availability and the harvesting sector is steadily being impacted, as asserted by Arulananthan (2017).

Similarly, the tourism industry has also done a remarkable job in leveraging the Sri Lankan economy (Tam, 2019). The same idea was brought forward by Salpage et al. (2019) stating that Sri Lanka, being an attractive destination for tourists, earns a significant amount of foreign exchange in the national economy. More importantly, it contributes to nearly 11% of the country's GDP as the third-largest foreign exchange earner of the country (Salpage et al., 2019). In Sri Lanka, the majority of the tourism sector has been established along the coastal zone of the country, where the coastal areas have largely been influenced by the adverse impacts of climate change including sea-level rise, river flooding, coastal erosion, and extreme rainfall (Tam, 2019). As a

result, a spillover effect has occurred on nature-based tourism in the coastal zone of Sri Lanka.

Moreover, the energy consumption of the country also has prominently risen due to the increase in temperatures (Hettiarachchi et al., 2014). In general, a one-degree increase in ambient temperature level will lead to a 0.5%-8.5% increase in electricity demand of the country, where a significant share of that amount can be identified due to the increase in electricity demand associated with the rise of temperature under climate change (WBG, 2020). Although Sri Lanka has abundant energy resources to ensure energy conservation within the country, energy conservation has been critically undermined due to the impacts of climate change (Hettiarachchi et al., 2014). Accordingly, high energy consumption can be identified as another key economic challenge that has arisen due to the impacts of climate change.

In contrast, sometimes the agriculture sector, the tourism sector and energy consumption have contributed conversely to the occurrence of climate changes since they can be identified as the major sources of greenhouse gases (Arora, 2019; Peeters, 2007). Thus, it is obvious that the opposing side of the occurrence of a number of challenges on many sectors due to climate change (i.e. contribution of many sectors for the occurrence of climate change) can also be identified coupled with the above-discussed factors.

#### **3.4.1.2 Social challenges**

Many of the climate-related issues are likely to disproportionately influence the communities in Sri Lanka, leading to a number of short-term and long-term effects (WBG, 2020). As stressed by Withanachchi (2019), the standard of living of the people in Sri Lanka has been significantly impacted due to these climate change impacts. Agricultural-based communities in Sri Lanka are considerably vulnerable to many severe weather events including droughts, floods, landslides and increased temperature levels, largely, leaving their livelihoods at greater risk (Karunaratne, 2021). Similarly, the coastal community has also been heavily impacted due to sea-level rise and cyclones resulted from climate change, as further disclosed by Punyawardena

(2002). More importantly, these changes in climate have tended to encourage societal inequalities, leading to a large increase in poverty within the country (Climate Change Secretariat, 2016). It is mainly because of the direct repercussions on the basic living patterns of the people due to the considerable impacts on their settlements and infrastructure. Thus, it can be argued that living styles of the communities within the country have enormously impacted due to the climate change. In here also, the opposing side of the occurrence of challenges due to climate change can be identified as mentioned in Section 3.4.1.1, whereby the living patterns of people (including many activities such as burning fossil fuels and cutting down forests) have fueled the occurrence of climate change mainly by emitting greenhouse gases (Kottawa-Arachchi & Wijeratne, 2017).

Human health can be identified as another key concern that climate change can create many strong impacts. Presently, health impacts including deaths and disabilities caused by severe weather events have been reported more frequently than before in Sri Lanka (Madurawala, 2011). As indicated by Cho (2020), the outbreak of many types of diseases can be identified as a crucial problem today in Sri Lanka due to the adverse impacts of climate change. Some of these health issues include respiratory diseases, allergies, cancers, foodborne diseases, water-borne diseases, and impacts on mental health (Ministry of Health, 2017). Further, problems in accessing safe food and drinking water are also inevitable as the issues affect human wellbeing due to climate change (Madurawala, 2011). The spreading of kidney diseases and dengue incidents can be regarded as some of the recent examples of such major health issues arisen in Sri Lanka mostly during the time of extreme weather events (Cho, 2020). Moreover, as depicted by Ranagalage et al. (2017), most of the urban areas in Sri Lanka have tended to encounter a relatively higher temperature in the surrounding rather than in rural areas due to the heat island effect as well as thermal expansions arisen from climate change. Thus, a number of health issues can occur for people in urban areas due to exposure to extreme heat. Moreover, sanitation issues and other social problems are significantly unavoidable along with these adverse impacts of climate change in a country like Sri Lanka, which is still developing. As deduced by World Health Organization [WHO] (2015a), the risk of spreading these different types of health

issues in Sri Lanka will largely increase towards 2070 with the prolonged exposure to extreme climate change impacts.

In this context, it is witnessed that a huge impact has occurred on the social wellbeing of the country due to climate change.

#### **3.4.1.3 Environmental challenges**

To date, climate change has adversely impacted the natural environment, altering many natural systems connected with the ecosystem, water cycle and bio-diversity of the country (Eriyagama & Smakhtin, 2010). Many ecosystem services, which are indispensable for the existence of human beings have heavily declined as a result of these impacts on the environment.

The major environmental challenge due to climate change can be identified as the increased occurrence of extreme weather events (Climate Change Secretariat, 2016). In Sri Lanka, many more extreme weather events like floods, droughts, landslides, sea-level rise, temperature rising, changes in rainfall patterns etc. occur each and every year, leading to many disastrous situations within the country. Indeed, the frequency and severity of such extreme weather events are mainly accelerated due to climate change, as affirmed by Eriyagama and Smakhtin (2010). Water resources can be identified as a crucial part of the environment, which mainly fuels domestic activities, agricultural activities, many industrial activities and a significant share of power generation of the country (Eriyagama et al., 2010). Further, besides fulfilling the needs of human beings, the survival of all ecosystems mainly relies on these water resources. Although various water resources can be seen in Sri Lanka based on its topography, the availability, supply, distribution, use and conservation of these water resources mainly depend on the climate conditions of the country (Climate Change Secretariat, 2016). Hence, these water resources can be largely impacted due to the catastrophic effects of climate change in the country. As identified by Eriyagama et al. (2010), groundwater can be polluted and water resources can be reduced in many areas of the country, threatening the quality and quantity of the country's water. Being a tropical country, the lack of drinking water has become the biggest issue than ever before in

many areas in Sri Lanka which are densely populated and experience relatively high temperature levels (Cho, 2020). It was proven by that study concerning Kurunegala district as an example. Also, the North Central Province, North Province and Eastern Province of Sri Lanka have been largely experienced issues in water resources due to climate change (The Asian Legal Resource Centre, 2010).

Sri Lanka is currently enjoying a rich and unique diversity of fauna and flora, providing many economic and environmental benefits (Kottawa-Arachchi & Wijeratne, 2017). However, the biodiversity of these ecosystems has significantly changed and reduced due to the impacts of climate change. As noted by Kottawa-Arachchi and Wijeratne (2017), natural habitats of the species are being changed and modified, while the timing of natural events like flowering and egg-laying are considerably shifting by altering the life patterns of the species in a negative manner. The temperature level of the ecosystems in urban areas can be vastly increased due to climate change coupled with the urban heat island effect, as discussed in Section 3.4.1.2. Moreover, Sri Lanka has a biologically rich and diversified coastal environment with unique ecosystems such as beaches, lagoons, marshlands, bays, sand dunes and a variety of water bodies (Climate Change Secretariat, 2016). All these ecosystems have been affected significantly due to the sea level rise, coastal erosion, inundation and many other impacts of climate change. Accordingly, it is obvious that the natural environment also has been crucially affected by the adverse impacts of climate change in Sri Lanka creating many challenges.

Overall, the impacts of climate change in Sri Lanka are widespread and they have created a number of social, economic and environmental challenges, which are increasing day by day. Hence, overcoming these challenges has become an emerging requirement today, where climate change mitigation and adaptation can be identified as a crucial entity in this direction as discussed in the next section.

### **3.5 Climate change mitigation and adaptation**

As discussed in the previous sections, climate change, which is mainly man-induced, has become a crucial issue today in Sri Lanka, leading to many more challenges. Thus,

appropriate actions under climate change mitigation and adaptation need to be followed in order to overcome those challenges considerably.

Climate change mitigation can be identified as human intervention to curb the proximate causes for climate change directly or indirectly to limit the extent of climate change (Qi & Terton, 2022; Swim et al., 2011). That means, it includes the actions taken by humans in order to reduce the causes or sources of climate change. These mitigation measures mainly consider the reduction of greenhouse gas emissions to the atmosphere with the intention of slowing down and limiting the possible climate-related issues (Adedeji et al., 2014). For example, as per the findings of the International Energy Association (IEA) in 2009, the world is headed for the atmosphere's CO<sub>2</sub> concentration above 1000 ppm and the mitigation action scenario is proposed to limit that level to 450 ppm (Lackner et al., 2015). To date, many of the world's countries have been tended to enact a number of mitigation measures including policies and plans to reduce the adverse impacts of climate change. Sometimes the impacts of climate change appear unescapable even with the mitigation measures. Hence, many scientists and other relevant parties have been focused their attention on the aspects of the country's vulnerability to climate change and adaptation to those changes as a supplementary strategy to mitigation measures (Qi & Terton, 2022). Nowadays, climate change mitigation together with adaptation has a growing interest as an appropriate way to counteract the identified climate change challenges. In fact, many countries tend to develop adaptation solutions as well and implement preferred actions to respond to the adverse impacts of climate change that are already happening as well as will happen in the future (United Nations Framework Convention on Climate Change [UNFCCC], 2021). Climate change adaptation is a very broad term and there have quite many attempts to define it. According to Mertz et al. (2009), climate change adaptation can be broadly explained as making adjustments by social, economic, and ecological systems in order to reduce their vulnerability for the actual as well as expected climate change challenges. They further elaborated that climate change adaptation mainly comprises actions, which need to be performed to reduce vulnerability or enhance resilience.



Contrary to climate change mitigation, these adaptation responses do not contribute to reduce the impacts where communities are trying to reconcile and adapt themselves as best as they can to climate change (Adedeji et al., 2014). According to Watkiss and Cimato (2018), climate change adaptation involves a wide range of actions undertaken by different parties at different spatial scales like national, subnational, or regional. The adaptive capacity of the countries needs to be properly enhanced through appropriate actions until the communities and individuals will gain the ability to cope with climate change and its impacts. When considering the concepts of climate change adaptation and mitigation, the goals of climate change adaptation are largely place-based, while the mitigation has clear and specific goals (Funfgeld & Mcevoy, 2011). In fact, climate change adaptation should focus on reducing the hazardous situations that the community faces due to climate change, by identifying priorities and needs of the community and valuing the knowledge that is already used by them to cope with climate change (Smith, 2020) while climate change mitigation directly links with reducing the causes for climate change by reducing the greenhouse gas emissions. In this context, it is evident that climate change mitigation is focusing to tackle the causes and minimise the possible impacts whilst climate change adaptation is trying to look at how to moderate and cope with the impacts and take advantage of opportunities that arise (Climate Change Secretariat, 2016).

Having identified the overall concept of climate change mitigation and adaptation in curbing the prevailing and expected climate change challenges, the next section explores the current status of climate change mitigation and adaptation in Sri Lanka.

### **3.5.1 Current status of climate change mitigation and adaptation in Sri Lanka**

When considering the Sri Lankan context, mitigation and adaptation for the constantly happening climate change has become an urgent need of the country to overcome the climate change challenges.

As affirmed by Climate Change Secretariat (2016), the successful implementation of climate change adaptation in Sri Lanka would mainly depend on its vulnerability to climate change and adaptive capacity. Many significant gaps and barriers can be

identified in the country's adaptive capacity, which mainly includes gaps in knowledge and skills, technologies, information and livelihood assets, as further stated by the study. Thus, there is a crucial requirement to bolster the adaptive capacity of the country towards successful climate change adaptation. Also, as noted by Ministry of Mahaweli Development and Environment (2012), while taking the implementation of climate change adaptation measures as the priority, many efforts have been undertaken in Sri Lanka to reduce the greenhouse gas emissions as well under climate change mitigation. Some of the available mitigation measures include enhancing the energy efficiency from conventional sources, increasing the use of renewable energy and controlling cutting and burning forests (Institute of Policy Studies [IPS], 2009). Presently, many institutional actions have been taken in Sri Lanka to formulate and implement different types of policies and plans as climate change adaptation and mitigation responses for climate change (Hewawasam & Matsui, 2019). Although a number of policies, legal enactments and plans, which contain provisions regarding the contribution for reducing climate change impacts are available, the policymakers and other relevant parties need to be further encouraged to strengthen more the inclusion of climate change considerations into prevailing as well as new policies and plans in Sri Lanka (UNDP, 2017).

The above discussion shows the current status of implementing climate change adaptation and mitigation in Sri Lanka to address the climate change challenges. Further, it was identified that many initiatives including policies and plans have been undertaken in Sri Lanka up to a considerable extent in this direction. Accordingly, the section below takes this discussion forward to identify the different policies and plans which have been formulated and executed towards climate change mitigation and adaptation in Sri Lanka with the collaboration of many parties.

### **3.6 Different policies and plans available for climate change mitigation and adaptation**

As discussed in the previous section, an emerging focus has been given for climate change mitigation together with climate change adaptation all over the world since climate change impacts are getting worse day by day. In doing so, the implementation

of a wide range of policies and plans with climate change considerations are rapidly growing today across different countries (Lesnikowski et al., 2020). A policy can be defined as a specific set of guidelines or principles adopted by a particular organisation in order to govern the future actions (Pencheon et al., 2008). As mentioned by Ong (2018), plan can be identified as a roadmap which includes a set of future actions that are needed to accomplish different objectives. A strategy and an action plan are complimentary to each other where the strategy can be regarded as the mental part of reaching a goal while an action plan is the physical part of reaching a goal (Olivia, 2011). Indeed, these policies and plans have been actively contributed to the decisions taken today with regard to current and future impacts of climate change (Watkiss & Cimato, 2018). A strong linkage can be identified between climate change vulnerabilities and the implementation of policies and plans to address them, where those policies need to be properly and carefully devised by considering the current and future situations (Mertz et al., 2009). Also, it is highly paramount to know that up to what extent these policies and plans should be proactive or reactive, where the former refers to adapting in anticipation of a change, while the latter refers to adapting as a response to the changes, as further revealed by them.

To date, a large number of contributions towards these policy formulations and implementations can be identified in the global context with the intention of combatting the prevailing climate change challenges. In 2015, countries have committed to adopt the Paris climate change agreement in order to shape the global response to the adverse climate change challenges (Butler, 2018; American Psychological Association, 2022). The agreement has brought all UNFCCC signatory nations together to deal with climate change impacts by reducing vulnerability, strengthening resilience and increasing adaptive capacity in the context of reducing global warming. Sendai Framework for Disaster Risk Reduction, which was adopted for the period of 2015-2030 can be regarded as another concern in this direction (Kelman, 2015). Enhancing the resilience of the poor and vulnerable communities for climate change and reducing their exposure to extreme weather events and other social, economic and environmental disasters have been targeted through this initiative, as further noted by Kelman (2015). Adding to this, Cancun Adaptation Framework was

adopted in 2010 as an outcome of a UNFCCC climate conference in Mexico (Warner, 2012). It has also committed to help developing nations especially to adapt to the prevailing climate change impacts. Furthermore, most recently, The European Commission has adopted its new EU strategy towards climate change adaptation targeting to become climate resilient by 2050 by adapting to the unavoidable climate change impacts (European Commission, 2021). At the same time, the Climate Target Plan has been proposed recently by The European Commission as a mitigation effort with the ambition of reducing greenhouse gas emissions by 2030 and achieving climate neutrality by 2050. Accordingly, many global efforts for implementing climate change policies and plans to overcome the climate change impacts and adapting to them can be identified in this manner.

By considering the current global practices regarding these policy implementations, most of the developed countries like European regions, American states etc. are often depicted as the countries, which have implemented and practiced proper policy implications (Hewawasam & Matsui, 2019). However, as noted by Yamane (2009), many of the developing countries including Sri Lanka, are portrayed as having somewhat ineffective and weak policy formulations and implementations with climate change considerations. The next subsection focuses what are the policies and plans available in Sri Lanka in order to face the climate change challenges that are worsening day by day.

### **3.6.1 Climate change policies and plans available in Sri Lanka**

When examining the historical development of climate change policies in Sri Lanka, many policies and plans have been formulated and implemented within the country during the past few years (Hewawasam & Matsui, 2019). As further deduced by them, a few major events in the history of climate change policy development in Sri Lanka can be identified namely the establishment of the Climate Change Secretariat (CCS) under the Ministry of Environment, the implementation of National Climate Change Policy (NCCP) by CCS and further developments under NCCP. As per the findings by Global Environment Facility [GEF] (2018), National Environmental Action Plan (NEAP) can be identified as one of the main actions, which was initiated by the

government in 1991 for the period of 1992-1996 including the concerns regarding the potential risk of climate change within the country and priority areas for them. The further amendments of this plan have shown a greater institutional commitment towards actions for climate change not only at the local level but also in the international arena as well (Hewawasam & Matsui, 2019). Adding to this, National Environment Policy (NEP), and Capacity Assessment Action Plan were also implemented in Sri Lanka in order to withstand the impacts of climate change.

Although such policies were implemented with climate change considerations, the scientific community proved with overwhelming evidence that the impacts of climate change are becoming more adverse day by day (Eriyagama & Smakhtin, 2010). As a result, the CCS was established with the aim of providing the strong commitment of the country to take appropriate actions for the prevailing climate-related issues (Hewawasam & Matsui, 2019). The development of NCCP for the period of 2009-2016, which was partly based on the National Action Plan for Sustainability, can be identified as one of the main priorities of CCS, as further disclosed by them. The main goal of this policy was to implement adaptation and mitigation measures for the severe impacts of climate change within the framework of sustainable development, by addressing those climate-related issues locally as well as in the global context (Marambe et al., 2015). That means, eliminating the catastrophic consequences of climate change in Sri Lanka was the long-term goal of the NCCP. Adding to this, the National Climate Change Adaptation Strategy for Sri Lanka, which was prepared in 2010 for the period of 2011-2016 can be identified as another major achievement amongst the key national initiatives executed by CCS, as further disclosed by Marambe et al. (2015). It laid out a prioritised framework for required actions and investments to move Sri Lanka and its people systematically towards a climate change resilient future under climate change adaptation, as further indicated by the study. Thereafter, National Adaptation Plan (NAP) for climate change impacts was initiated by the government for the period of 2016-2025 as the next logical step for meeting the climate change adaptation, which was later revised and updated (Climate Change Secretariat, 2016). The expert support for the execution of NAP was secured by establishing the National Expert Committee on Climate Change Adaptation (NECCC-

Adaptation), as per Hewawasam and Matsui (2019). In fact, NAP is a country-driven and fully transparent approach to deal with the impacts of climate changes, which provides opportunities for all parties for developing policies, technological development, strengthening the corporation, resource mobilisation etc. with the prospect of enhancing the resilience of the vulnerable communities, sectors and areas of the country (Climate Change Secretariat, 2016). More importantly, when initiating and executing these climate change policies in Sri Lanka, the International Water Management Institute (IWMI) has made a significant contribution by incorporating their findings to develop responses to the impacts of climate change (International Water Management Institute [IWMI], 2013). More importantly, the adoption of NDCs for climate change mitigation and adaptation under the Paris Agreement in 2016 can be regarded as another foremost commitment in this direction (Hewawasam and Matsui, 2019). It included many measurable targets, indicators and timeframes for implementing different climate actions towards climate change mitigation and adaptation within the country.

Moreover, National Policy on Disaster Management can be identified as another key policy implication enacted in 2010, articulating the overarching principles and actions for disaster management in Sri Lanka (National Council for Disaster Management [NCDM], 2010). Further, the importance of initiating integrated systems, where disaster risk reduction and climate change mitigation and adaptation can be integrated has strongly insisted through this policy in order to address the prevailing disaster risk. Apart from these initiatives, Clean Development Mechanism (CDM) policy and a few CDM projects have also been implemented in Sri Lanka as mitigation strategies to reduce the greenhouse gas emissions to the atmosphere (Eriyagama & Smakhtin, 2010). Indeed, CDM policy can be identified as a market-based mechanism, which creates many opportunities for reducing emissions and promoting sustainable development by implementing a number of projects in developing countries (Wijesinha, 2013). In Sri Lanka, National Policy on Clean Development Mechanism was initiated by the CCS under the Ministry of Environment to meet sustainable development of the country in terms of improving living standards of the community, improving equity, conserving local resources, using renewable energy sources and

improving health, as further mentioned by Wijesinha (2013). At the same time, National Action Plan for Haritha Lanka Programme was initiated as another important mission in mitigating climate change issues within the country by focusing on many aspects of reducing greenhouse gas emissions such as waste management, land use practices etc. (Ranasinghe, 2010).

Furthermore, climate change considerations were included in many sectorial policies and plans as well such as the National Agricultural Policy, National Housing Policy etc. focusing on the impact of climate change towards those specific fields or areas (Marambe et al., 2015; Hewawasam & Matsui, 2019). Also, Sri Lanka is currently benefitting from the Climate Change Adaptation Project, implemented by the Ministry of Mahaweli Development and Environment and the World Food Program in collaboration with the United Nations Development Program (Withanachchi, 2019). The project has contributed to strengthen the livelihoods of the communities that are significantly vulnerable to constantly changing climate patterns by facilitating alternate sources of income and climate-resilient livelihoods. Such policies and plans are highly beneficial for the communities in Sri Lanka since there is a strong requirement for policy-level initiatives for them to overcome entrenched inequality, as noted by (Global Environment Facility [GEF], 2016).

In a nutshell, by taking into account the above factors, it is witnessed that somewhat stable and persistent support has been gained from the policymakers and other relevant parties for the implementation of climate change policies and plans in Sri Lanka to cope with the adverse impacts of climate change. The summary of climate change policies and plans captured through the existing literature can be presented as shown in Figure 3.1.

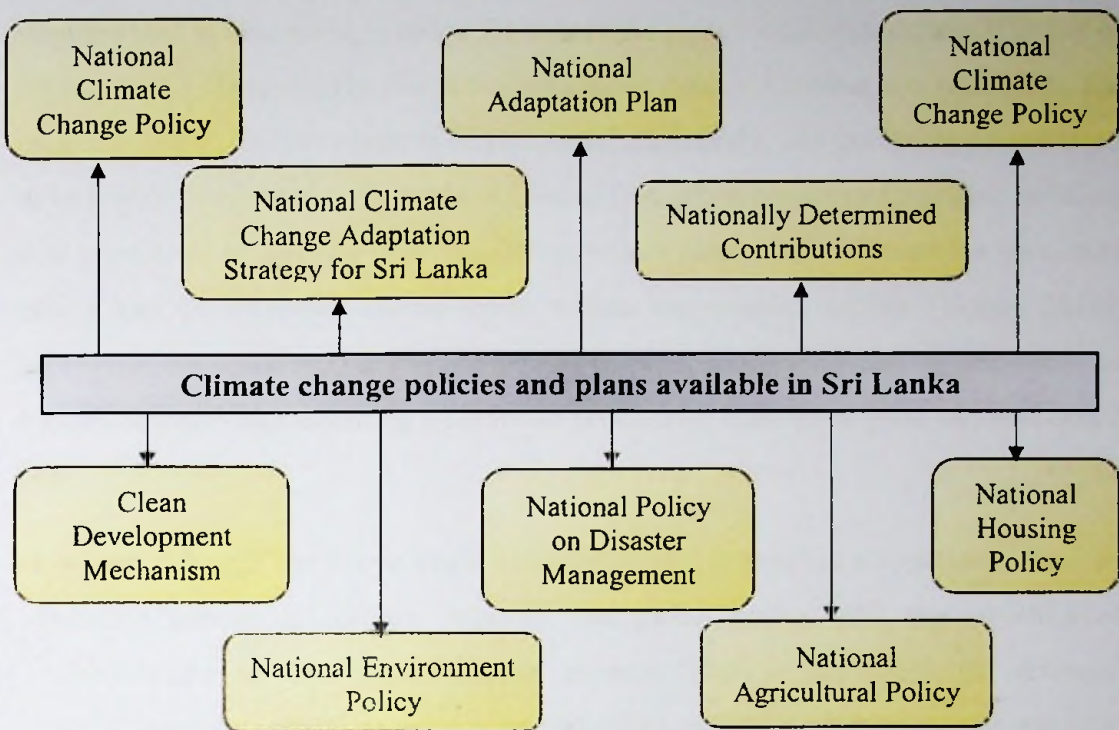


Figure 3.1: Climate change policies and plans available in Sri Lanka

Having identified the policies and plans towards climate change mitigation and adaptation, the next section focuses to explore the barriers to formulate and implement such policies and plans.

### 3.7 Barriers in formulating and implementing climate change policies and plans

When implementing any type of policy, the ultimate goal of it should become a success in many ways by fulfilling various requirements (Tezera, 2019). In fact, as disclosed by Hudson et al. (2019), the factors which shape the policy formulations and implementations seem to be more complex, multileveled and multifaceted. The situation is almost the same when it comes to climate change policies as well. Accordingly, the main concerns connected with the policy executions can be presented as follows. According to Tezera (2019), the design of the policy is significantly vital since it indicates the logic between the policy issue and the solution provided as well as the way of enacting the policy. Further, the clarity of the policy objectives also plays a pivotal role in designing and implementing them successfully. Moreover, the implementation strategy which means the operational plan that guides the policy to be

implemented is also highly needed for successful policy implementations (Fischer & Miller, 2007). Accordingly, the policy objectives need to be clear and consistent, the implementation process needs to be structured adequately, and involving parties need to be highly committed to its goals. Added to this, when implementing these policies, it is prominent to identify their feasibility, which determines whether the particular policy can be executed conveniently within the current setting (Yoon, 2018). Moreover, the collaborative engagement of relevant individuals and organisations in formulating and implementing a particular policy also makes it a good and successful one.

However, although the whole world has been tended to practice mitigation as well as adaptation actions at country, regional and global scales with the intention of combatting the adverse climate change impacts (Zhao et al., 2018), an increased occurrence of potential barriers can be identified, which hinder the implementation and execution of climate change policies and plans, urging the critical need of addressing them. It is mainly because of the failures to fulfill the relevant requirements for successful policy implementation. According to Watkiss and Cimato (2018), policy failures can occur with the presence of these barriers resulting in major interruptions for implementing effective climate actions within developing countries.

More importantly, these barriers for climate change policy implementations can be identified under six main categories namely economic, social, institutional, technological, informational and other barriers, as deduced by Masud et al. (2017). Many examples for such barriers to climate change policy making and implementing activities can be extracted from the global context. As indicated by Masud et al. (2017), inadequate financial support for implementing these policies and plans can be regarded as a key economic hindrance in most countries. It is mainly because the financial strength acquired from different possible ways plays a vital role in making these policy formulations and implementations more effective and efficient. Lack of public awareness, understanding and knowledge can be identified as a major social barrier in undertaking different policy actions towards climate change (Gonzalez-Hernandez et al., 2019). It is mainly because such understanding and knowledge levels of the

communities may make a considerable influence on their willingness to perform different climate actions and thereby, they can provide a significant contribution to perform these actions successfully. Furthermore, low level of priority people gives for climate change and its impacts due to their poor awareness make another major barrier in this direction. When considering the institutional barriers, government failures due to ineffective institutional support takes a key concern, especially in developing countries (Watkiss & Cimato, 2018). It may highly lead to create interruptions or slow down the implementation processes of policies and plans resulting in major policy failures. Overlaps between the institutions involve in formulating and executing policies and plans can be regarded as another institutional barrier, as further noted by Watkiss and Cimato (2018). It is mainly due to the different objectives, authorities, power and resources of the institutional participants. At the same time, lack of technological support and other technology-related barriers also has become main obstacles in this regard as disclosed by Clements et al. (2011). In this context, it is evident that a number of barriers can be identified when formulating and implementing these climate change policies and plans in majority of the countries in the world.

### **3.7.1 Barriers in formulating and implementing climate change policies and plans in Sri Lanka**

When it comes to the Sri Lankan context, it is not differentiating from the global context as discussed previously. A number of barriers have been created many obstacles in the successful implementation of climate change policies and plans by reducing the adaptive capacity of the country and increasing the vulnerability of communities, sectors and areas (Climate Change Secretariat, 2016). Those barriers can be discussed in a comprehensive way under six main categories as below.

#### **3.7.1.1 Economic barriers**

The successful formulation and implementation of climate change policies and plans are mainly driven by adequate funding facilities (Hettiarachchi et al. 2014). That means financial resources can be regarded as the most important resource among the required resources for climate action implementations at any level. In fact, it is utmost



important to further strengthen the prevailing climate finance towards enhancing climate change policy network within a developing country like Sri Lanka (Climate Change Secretariat, 2016). It will help to perform the policy formulations and implementations without any interruption by ensuring the resilience of communities, areas and other sectors of the country significantly. Accordingly, it is apparent that the economic constraints mainly include a lack of funds and financial incentives by the government and other respective parties for climate actions, which is at the pinnacle in Sri Lanka. More concisely, the lack of financial support has limited the execution of climate change responses (Thathsarani & Gunaratne, 2018). As a developing country, Sri Lanka has limited funding available for those policy implementations, making them more inefficient in performance (Wijenayake & Mombauer, 2019). This was further supported by Climate Change Secretariat (2014) and Mahanama et al., (2014) stating that inadequate financial assistance for the relevant parties including local level agencies and authorities have created a prominent barrier in implementing climate actions within the country to deal with the prevailing and expected climate change impacts, leading to dormant policies and plans.

On this premise, it is evident that lack of funding has become a greater barrier for formulating and implementing different climate change policies and plans in a country like Sri Lanka with many eroded economic conditions.

#### **3.7.1.2 Social barriers**

Social inclusion for formulating and implementing climate change policies and plans highly matters in any country (Ampaire et al., 2016). That means, in formulating and executing mitigation and adaptation responses for prevailing and expected climate change, the role of the community is unprecedented. However, in Sri Lanka, such a strong involvement of the communities cannot be identified today in an acceptable manner (Panditharatne, 2016). As further noted by the study, the long-term involvement of the communities in this direction is exclusively important in order to make these policy implementations more effective and efficient. Hence, the poor involvement of communities has created a significant barrier in overcoming the climate change challenges in Sri Lanka.

Furthermore, generally, a proper understanding of the community on the climate change issues, their acute impacts and the actions that need to be taken is significantly vital to ensure effective implementation of these responses (Zea-Reyes et al., 2021; Masud et al., 2017). As stressed by Climate Change Secretariat (2010), climate change mitigation and adaptation will begin and be sustained mainly at the community level by individuals, families and other communities, who share the impacts of climate change. Thus, as intertwined and holistic solutions for prevailing and expected climate change challenges in Sri Lanka, climate change adaptation and mitigation should focus on many areas like climate-resilient livelihood developments, disaster preparedness and mitigation, ecosystem conservation, food and water security etc. (UNDP, 2021). In doing so, the relevant information needs to be made available at these community levels in their local languages (Climate Change Secretariat, 2010). That means social awareness regarding climate change impacts and possible solutions plays an integral role to accomplish the goals of the policies and plans remarkably. However, as stressed by Wijenayake and Mombauer (2019), the understanding of the people in Sri Lanka with regard to the current context of climate change and the responsive actions is notably lacking, directing to a negative influence on the implementation of the policies and plans.

At the same time, positive perceptions of the people with regard to policy implementations are also highly paramount in achieving a climate-resilient country, since they will assist to have better reinforcement for climate change policy actions (Masud et al., 2017). According to Esham and Garforth (2013), community perception with regard to the effectiveness of the climate change measures can be identified as a significant factor influencing the implementation process of those measures. More importantly, different cultural, ethical and religious considerations shape the individuals resulting in a wide variety of perceptions as a society, which are often quite complex (Watkins & Cimato, 2018). In here, the perception of people mainly refers to the pessimistic views of the community about the effectiveness of the climate change adaptation and mitigation measures to overcome the climatic adversities. As indicated by Esham and Garforth (2013), in the current context, negative community perceptions regarding the effectiveness of the past as well as ongoing policies, plans and strategies

have featured as a huge barrier to implement new policies and plans in Sri Lanka. In this context, it is true that lack of social understanding and poor perceptions of the people regarding the every aspect of climate change policies and plans have become main barriers for their implementation.

### **3.7.1.3 Institutional barriers**

When formulating and implementing these climate change policies and plans in any country, many organisations, institutions, government and other relevant parties have been involved (Ampaire et al., 2016). However, many impediments can occur with regard to the involvement of these parties during the policy-making and implementation processes, leading to different obstacles in achieving their outcome.

Indeed, a tendency for the responsibilities in this direction to be divided across many parties can be identified due to such involvement of different parties with different areas of expertise (Hettiarachchi et al., 2014). Thus, a proper collaboration among those parties is highly paramount to make the policy formulations and implementations more productive (Zea-Reyes et al., 2021). This idea was further strengthened by Tam (2019) stating that the best outcome of the policies and plans can be accomplished through collaborative efforts of the stakeholders of the government sector as well as the private sector and civil society. However, most of the developing countries are somewhat struggling to ensure proper institutional cohesion during the climate change policy making and implementation activities (Wijenayake & Mombauer, 2019). When it comes to the Sri Lankan context, the responsibilities of these policy implementations have been fragmented across different parties such as communities, non-governmental organisations, and Ministries like Irrigation and Water Resources Management, Ministry of Natural Resources, Ministry of Environment etc. (Hettiarachchi et al., 2014). A proper collaboration appears to be significantly missing among those parties in Sri Lanka, where most of the policy implementations, strategic plans and other initiatives pertaining to climate change adaptation and mitigation are undertaken in an ad-hoc manner due to the poor collaboration (Climate Change Secretariat, 2016). As divulged by Tam (2019), getting both government and private sectors together to achieve common goals of climate change adaptation and mitigation is quite

challenging. Many political backgrounds, which are so volatile have been made more difficulties in getting the genuine commitment from the government sector in conjunction with the private sector towards these policy implementations, as further insisted by Tam (2019). For instance, the Strategic Plan for Tourism in Sri Lanka highlighted that a number of hurdles have arisen during the climate change policy implementations in the tourism sector due to deficient institutional coordination (Kpundeh, 2017). Hence, it is obvious that poor institutional collaboration has become one of the major barriers, which discourage the execution of climate change policies and plans in Sri Lanka.

According to Panditharatne (2016), when initiating and executing these policies and plans, the outputs of them need to be properly monitored and evaluated in a timely manner by the respective parties in order to accomplish their ultimate goals successfully. However, such appropriate inbuilt monitoring and evaluation mechanisms by the relevant parties are significantly lacking today resulting in many inefficiencies during the implementation processes of climate change policies and plans. Accordingly, poor institutional support for monitoring and evaluation of the expected outcomes of the climate change policy implementations can be identified as another main barrier.

#### **3.7.1.4 Technological barriers**

When implementing climate change responses, enormous technological support is highly required to ensure the effectiveness of the implementation activities (Axon, 2010). It was further supported by Clements et al. (2011) stating that technological development has become a key contributor for attaining successful climate change policy implementations in any country. However, a number of technological gaps and difficulties, which are standing in the way of climate change policy implementations can be identified in many countries.

When it comes to the Sri Lankan context, the situation is almost the same as still a developing country, where the technological gaps in executing these climate change policies and plans remain largely unanswered (Climate Change Secretariat, 2016).

Indeed, in Sri Lanka, the availability of advanced technologies to strengthen the climate change policy implementations seems to be significantly lacking (Wijenayake & Mombauer, 2019). For instance, monitoring systems for these responses need to be further established in many sectors to ensure their effectiveness. Further, Mahanama et al. (2014) depicted in their study that available technologies and other planning tools for integrating climate change considerations into urban planning are not sufficient to achieve the best outcome and it has discouraged the implementation of appropriate policies and plans in that direction considerably. Accordingly, it is witnessed that inadequate advanced technological developments have created a prominent barrier for implementing climate change policies and plans within the country in a fruitful manner.

Adding to this, lack of technical capacity, which consists of relevant expertise in the field, technical skills of the parties and other required resources has also become a major barrier in fulfilling the goals of the climate change policies and plans (Timilsina, 2021). As disclosed by Hewawasam and Matsui (2019), it is apparent that there is a crucial requirement of performing appropriate actions by the responsible parties for empowering the technical capacity of the country towards these policy implementations in Sri Lanka. This was supported by Wijenayake and Mombauer (2019) stating that most of the time, the formulation and implementation of these policies and plans require strong technical assistance and technology transfers from developed countries in leveraging their expected outcomes. Furthermore, as stated by World Health Organization [WHO] (2015b), the capacities of the existing technologies need to be further expanded and novel technological solutions need to be introduced to enable better climate change adaptation as well as mitigation. In line with the above-mentioned barrier, another barrier for implementing climate change policies and plans can be identified as lack of training for relevant parties with regard to the available technological developments and their usage in implementing those responsive actions (United Nations Framework Convention on Climate Change [UNFCCC], 2014). As indicated by Mahanama et al. (2014), inadequate technical know-how, skills and knowledge of decision-makers and other parties on many aspects of climate change

have become a major impediment in executing the policy implementations, leaving the necessity of training in this direction at the pinnacle.

#### **3.7.1.5 Informational barriers**

It is highly paramount to have adequate and appropriate information in every aspect regarding climate-related issues within the country to provide effective guidance for the climate change policies and plans (Climate Change Secretariat, 2016). That means, major improvements need to be ensured in the generation of relevant climate information, which can be assisted by many stakeholders who are engaging in policy formulation and implementations. However, to date, many obstacles can be identified with regard to the generation of adequate information, leading to major hindrances during the climate change policy making and implementing activities (Institute of Policy Studies of Sri Lanka [IPS], 2018).

As pinpointed by IPS (2018), not having adequate information regarding nationwide climate change and its occurrences in Sri Lanka can be identified as one of the critical informational barriers to implement climate change policies and plans. Although formulating and executing the appropriate actions for climate change appeared to be more and more multi-sectoral undertakings, a significant gap has arisen in the availability of required information, as further insisted by them. This was further strengthened by Tam (2019) mentioning that presently, Sri Lanka has been faced with a critical issue when implementing climate change policies due to the inadequacy of any solid evidence, data or conclusions on the climate-related issues. For instance, sea erosion and coral death have become a major crisis today in Sri Lanka due to the climate change, however, the lack of data and information with this regard at the national level has created many difficulties in taking appropriate actions, as further disclosed by Tam (2019). Moreover, the absence of proper data-sharing mechanisms can be identified as another key barrier for formulating and implementing climate change policies and plans in Sri Lanka (Wijenayake & Mombauer, 2019). They further endorsed it through an example, which states that some of the data regarding possible climate change issues for agriculture are not freely accessible for the community, resulting in many inefficiencies in taking appropriate actions.

Furthermore, a lack of awareness of the relevant parties regarding implementing climate change policies and plans can be identified as another barrier for implementing climate change policies (Climate Change Secretariat, 2016). Indeed, creating awareness about climate change and climate actions has been well-acknowledged from national-level ministries and government entities to local authorities (Wijenayake & Mombauer, 2019). This awareness has fragmented across planning, budget allocations, policy drafting and other activities that include in the process of implementing climate change policies and plans, as further stated by them. However, to date, the awareness of different stakeholders at all levels in this direction is significantly lacking in Sri Lanka urging the need of facilitating and promoting more the availability, accessibility and sharing of relevant information across all sectors (Climate Change Secretariat, 2010; Cho, 2020). Also, in Sri Lanka, many organisations in the government sector suffer from a lack of knowledgeable human resources, which highly discourages the effective use and dissemination of indigenous knowledge among the parties on the current and expected climate change issues (Wijenayake & Mombauer, 2019).

#### **3.7.1.6 Other barriers**

Adding to the aforementioned categories of barriers for formulating and implementing climate change policies and plans in Sri Lanka, several other barriers can be identified as discussed below.

Although the political empowerment of any country has tended to strengthen the policy implementations, nowadays, climate change adaptation and mitigation has become more complicated in some countries with many political confusions (Smit & Wandel, 2006). At the time of writing, Sri Lanka's political environment is also the same, where it is still volatile with the confusions of political upheaval, as stated by Tam (2019). As a result, Sri Lanka has faced many difficulties considerably in terms of executing climate change policies and plans (Wijenayake & Mombauer, 2019). For instance, many policies and plans for climate change adaptation as well as mitigation are already in place within the country, however, not effectively implemented due to the current political confusion (Tam, 2019). Thus, it is notably evident that current political

conditions in Sri Lanka have impeded the successful implementation of climate change policies and plans in a significant manner.

Moreover, being a developing country, Sri Lanka is significantly burdened with a number of fiscal and monetary difficulties to perceive required extra resources for climate change policy formulations and implementations, as elaborated by Climate Change Secretariat (2016). Accordingly, fulfilling all the required resources for implementing climate change responses has become a crucial challenge today in Sri Lanka. At the same time, governance issues with these policies and plans that need to be thoroughly addressed can be concerned as another impediment to climate action implementations (Climate Change Secretariat, 2016). The synergistic interplay between the relevant parties has created many complexities in multi-level governance in Sri Lanka since many institutions have worked on implementing climate change policies and plans (Pallawala et al., 2018). Therefore, the current institutional setup is not that conducive for these policy implementations due to the rigid and inflexible governance regimes and organisational cultures that each organisation already adhered (Panditharatne, 2016). Thus, it is highly necessary to determine the appropriate institutional structures with proper organisational cultures in order to ensure the effectiveness of the implementation of climate change responses.

On the whole, it is evident that a wide variety of barriers can be identified in formulating and implementing climate change policies and plans to cope with the acute climate change impacts. Those barriers were discovered under six main categories and the possible barriers under each category can be summarised as portrayed in Table 3.1.

Table 3.1: Summary of the identified barriers to climate change policy formulations and implementations

| Category | Barrier                                                                                                                       | Reference                       |
|----------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Economic | <ul style="list-style-type: none"> <li>Inadequate financial provisions</li> </ul>                                             | (Thathsarani & Gunaratne, 2018) |
| Social   | <ul style="list-style-type: none"> <li>Poor involvement of communities</li> </ul>                                             | (Panditharatne, 2016)           |
|          | <ul style="list-style-type: none"> <li>Lack of social awareness regarding climate change mitigation and adaptation</li> </ul> | (Wijenayake & Mombauer, 2019)   |

|                      |                                                                                                                                                                      |                                                                                |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                      | <ul style="list-style-type: none"> <li>Negative community perceptions regarding the climate change policies and plans</li> </ul>                                     | (Esham & Garforth, 2013),                                                      |
| <b>Institutional</b> | <ul style="list-style-type: none"> <li>Poor institutional collaboration</li> </ul>                                                                                   | (Climate Change Secretariat, 2016), (Tam, 2019), (Wijenayake & Mombauer, 2019) |
|                      | <ul style="list-style-type: none"> <li>Lack of monitoring and evaluation of the expected outcomes of the climate change policy implementations</li> </ul>            | (Panditharatne, 2016)                                                          |
| <b>Technological</b> | <ul style="list-style-type: none"> <li>Inadequate advanced technological developments</li> </ul>                                                                     | (Mahanama et al., 2014), (Wijenayake & Mombauer, 2019)                         |
|                      | <ul style="list-style-type: none"> <li>Lack of technical capacity of the country</li> </ul>                                                                          | (Climate Change Secretariat, 2014), (Hewawasam & Matsui, 2019)                 |
|                      | <ul style="list-style-type: none"> <li>Lack of technical training for relevant parties</li> </ul>                                                                    | (UNFCCC, 2014), (Mahanama et al., 2014)                                        |
| <b>Informational</b> | <ul style="list-style-type: none"> <li>Inadequate climate change data and information</li> </ul>                                                                     | (Institute of Policy Studies of Sri Lanka [IPS], 2018), (Tam, 2019)            |
|                      | <ul style="list-style-type: none"> <li>Lack of awareness of different stakeholders at all levels regarding implementing climate change policies and plans</li> </ul> | (Climate Change Secretariat, 2010), (Hettiaratchi, 2020), (Cho, 2020)          |
|                      | <ul style="list-style-type: none"> <li>Absence of proper data sharing mechanisms</li> </ul>                                                                          | (Wijenayake & Mombauer, 2019)                                                  |
| <b>Other</b>         | <ul style="list-style-type: none"> <li>Current political confusions</li> </ul>                                                                                       | (Wijenayake & Mombauer, 2019), (Tam, 2019)                                     |
|                      | <ul style="list-style-type: none"> <li>Lack of required resources</li> </ul>                                                                                         | (Climate Change Secretariat, 2016)                                             |
|                      | <ul style="list-style-type: none"> <li>Governance issues of the policy implementations</li> </ul>                                                                    | (Climate Change Secretariat, 2016), (Panditharatne, 2016)                      |

Accordingly, this section extensively discussed many barriers, which impede the formulation and implementation of different policies and plans for climate change adaptation and mitigation in Sri Lanka. Further, it is apparent that there is a growing necessity to apply appropriate solutions for the identified barriers in order to make these policy implementations more effective and successful. With this premise, the next section discusses the literature on the strategies for overcoming the identified barriers to empower climate change adaptation and mitigation in Sri Lanka.

### **3.8 Strategies to enhance the climate change policy formulation and implementation activities**

Since a wide range of barriers has been interrupted the formulation and implementation of climate change policies and plans in Sri Lanka, an exclusive necessity has arisen to overcome those barriers by applying appropriate solutions. Those solutions can be discussed based on the existing literature in a detailed way as follows.

#### **Improving the institutional support**

Poor institutional collaboration in implementing different policies and plans was discovered as a prominent barrier in the preceding section. Therefore, multi-sectoral collaboration, as well as Public-Private Partnerships (PPP), need to be particularly enhanced in order to supplement the formulation and implementation of climate change policies and plans within the country (Hettiarachchi et al., 2014). As noted by Tam (2019) and Climate Change Secretariat (2016), different collaborative plans and institutional mechanisms need to be well-established to perceive the strong public and private institutional support in this direction by ensuring the coordination of the relevant parties. This will help to gain contributions from many parties with different expertise and thereby these policy implementations will become more productive than before (Zea-Reyes et al., 2021).

#### **Providing proper education for the relevant parties**

The existing knowledge on climate change challenges and the importance of having policies and plans to overcome them need to be further strengthened at the formal education level since many impediments have been arisen in responding to climate-related issues due to the lack of knowledge (Climate Change Secretariat, 2016). Furthermore, the research institutions can make a significant contribution in this regard by conducting research focusing on policy implementations towards successful climate change adaptation and mitigation within the country (Tam, 2019). This was further supported by Wijenayake and Mombauer (2019) stating that the researchers should be further encouraged to develop novel innovative avenues in research to

identify the new hot spots in the significance of policy implementations to combat climate change challenges. Indeed, having such a broad knowledge level will facilitate the relevant parties to implement the climate change policies and plans within the country in an accurate manner.

### **Providing proper training and awareness**

The knowledge and skills of the parties can be more empowered through providing proper training for them with regard to climate change mitigation as well as adaptation and how well they can be achieved through these policy implementations (Climate Change Secretariat, 2016). Not only that, training on the required technological developments for these policy implementations also should be further strengthened since the inadequate technical know-how has created many obstacles in formulating and implementing these policies and plans (UNFCCC, 2014). Moreover, as disclosed by Climate Change Secretariat (2016), enhancing public awareness also plays an integral role in uprisings the existing knowledge in this direction since lack of social awareness has become a critical barrier today in implementing these policies and plans, as identified in Section 3.8.1.2. Accordingly, different nationwide programs need to be launched in a considerable manner within the country in order to raise public awareness with regard to the importance of having policies and plans in implementing climate change mitigation and adaptation measures to deal with the acute climate change impacts (Climate Change Secretariat, 2010).

### **Increasing financial provisions for policy implementations**

Inadequate financial provisions for executing the climate change policies were discovered as the major economic barrier today in Sri Lanka. In recognition of the importance of having adequate financing and investment dimensions, the relevant parties should pay their attention to acquiring the required finance that will be necessary for executing these policies and plans (United Nations Framework Convention on Climate Change [UNFCCC], 2007; Timilsina, 2021). According to Climate Change Secretariat (2010), potential financial options need to be allocated for continuing ongoing policies and plans as well as formulating novel policies and plans

to overcome the prevailing and expected climate-related issues. Further, a proper disbursement of available funds amongst the relevant parties, who are involved in executing these policy implementations has also taken a key concern to ensure successful climate change mitigation and adaptation. At the same time, being still a developing country, Sri Lanka is currently suffering from a lack of domestic funds and hence partnerships can be developed with international donors and funding schemes as well in order to fulfill the funding requirements for formulating and implementing these policies and plans (Tam, 2019). Such adequate financial provisions will provide a better reinforcement for the implementation of climate change adaptation and mitigation measures in a meaningful way within the country.

### **Support policy implementations with incentives**

A crucial necessity can be identified in Sri Lanka not only for financial incentives but also for non-financial incentives to stay motivate the relevant parties to implement the climate change policies and plans (Climate Change Secretariat, 2014). As disclosed by Climate Change Secretariat (2010), providing incentives will stimulate the interventions from various parties towards policy implementations in a greater manner. Hence, various projects to formulate and implement many policies and plans can be launched within the country successfully with the support of these incentives wherever possible (Timilsina, 2021). These incentives can be provided in terms of tax breaks or maybe even subsidies to encourage the livelihoods of the people who are most vulnerable to climate change, in a climate-resilient manner (De Silva, 2018).

### **Enhancing technological developments**

Technological developments have become vital in making climate change policy implementations more effective and accurate, as discussed in Section 3.8.1.4. Thus, available technological developments need to be further improved as well as novel technologies need to be introduced at different levels of the country (Hewawasam & Matsui, 2019). These technological supports for policy implementations need to be cost-effective, socially acceptable and culturally compatible in order to get the best outcome from them (UNFCCC, 2014). Also, many events and programs need to be

organised within the country to transfer these technologies and technological knowledge from developers and experts to the users and thereby those technologies can be assisted in making policy implementations more effective (Climate Change Secretariat, 2016). As further indicated by the study, the technological requirements can be fulfilled and further strengthened through collaboration with the international level as well. In this context, technological advancements and utilisation of available technologies will strongly encourage policy formulations and implementations towards successful climate change adaptation and mitigation in Sri Lanka.

### **Mainstreaming climate change considerations into development plans**

Mainstreaming climate change adaptation considerations into development plans has become another recent focus to mitigate the barriers in implementing policies and plans in most countries (Watkiss & Cimato, 2018). In doing so, mitigation and adaptation responses need to be integrated into existing development plans and decision-making processes of the country rather than implementing stand-alone responses, as further discovered by them. When considering the developing countries, Mertz et al. (2009) identified the mainstreaming of these climate change considerations with all relevant sectors as an integral part of the development and execution of the relevant policies and plans. In Sri Lanka also, mainstreaming climate change considerations into all domestic development policies and plans at national and regional levels has taken vital importance, however, needs to be further strengthened, as per Wijenayake and Mombauer (2019). In doing so, existing policy studies can be conducted and the options for integrating climate change considerations into development plans and the procedures to enact them can be further identified. This will create many conditions that necessary to overcome the major gaps and barriers existing at present in formulating and implementing climate change policies and plans.

### **Strengthening the community partnering**

In continuing to respond to the adverse challenges posed by the changing climate, community partnering plays a pivotal role. It is mainly because, mitigating and adapting to the constantly changing climate can be addressed better through well-

informed and collaborative community participation since people are the most vulnerable part for these climate issues (Australian Capital Territory, 2014). Ample opportunities need to be provided for the communities to participate actively at the regional level or even in wider, in implementing these policies and plans successfully (Panditharatne, 2016). As stressed by United Nations Framework Convention on Climate Change [UNFCCC] (2020), in a country like Sri Lanka, youth are the best stakeholders at the community level, who can provide their foremost contribution in this direction. However, since it is difficult to perceive the stand-alone contribution from the communities, the support from the other stakeholders at different levels such as local government, Non-Government Organisations (NGOs) and other institutions may highly require in strengthening the community participation in implementing these policies and plans, as further noted in the study.

On this premise, the appropriate ways of overcoming the identified barriers in formulating and implementing climate change policies and plans can be highlighted.

### **3.9Chapter summary**

The literature review strengthened the theoretical understanding of the researcher regarding the research area to be investigated. Climate change challenges posed by different climate change impacts were identified under three main categories namely economic, social and environmental. Thereafter, different policies and plans which include climate change considerations were captured based on the prevailing literature. Then, barriers to formulate and implement those policies and plans towards climate change mitigation and adaptation were explored under six main categories namely economic, social, institutional, technological, informational and other barriers. Several strategies to overcome those barriers were also presented. When exploring these said areas, the literature was reviewed in relation to the global trends as well as the Sri Lankan context.

## 4. DATA COLLECTION AND ANALYSIS

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### 4.1 Introduction

This chapter presents the process of data collection and a detailed analysis of the collected data through in-depth interviews and document review in order to accomplish the aim of the study. The findings from both in-depth interviews and the document review were presented separately under different sub-sections.

### 4.2 Data analysis of document review

The intention of reviewing grey literature was to get an in-depth understanding about what are the different policies, plans and strategies that have been formulated so far in Sri Lanka regarding climate change mitigation and adaptation and the interrelationships among them. Since a number of policies and plans are available that focus on climate change considerations directly as well as indirectly, it is better to have a clear understanding about what are their focuses and how they are interconnected prior to investigating the barriers to formulate and implement each and every policy or plan. It is mainly because, the identified barriers to formulation and implementation of these policies and plans also can be interconnected and continue further, if they are not properly overcome at their initial stage. Thus, the understanding on the whole climate change policy network is significantly vital. To that, it is fruitful to conduct a document review.

#### 4.2.1 Details of the reviewed documents

Based on the literature findings, 10 climate change policies, plans and strategies were identified (refer Section 3.6.1) where six (06) such sources were newly added by the respondents through the in-depth interviews (refer Section 4.3.4). Accordingly, the details of the selected sources which focus on climate change considerations directly and indirectly are tabulated under two separate tables as presented in Table 4.1 and Table 4.2.



Table 4.1: Policies, plans and strategies which directly focus climate change considerations

| Ref. No. | Name of the source                                                                    | Published year | Nature of the source |
|----------|---------------------------------------------------------------------------------------|----------------|----------------------|
| D-D1     | National Climate Change Policy of Sri Lanka                                           | 2012           | Policy               |
| D-D2     | National Climate Change Adaptation Strategy for Sri Lanka                             | 2010           | Strategy             |
| D-D3     | National Adaptation Plan                                                              | 2016           | Action Plan          |
| D-D4     | Nationally Determined Contributions (NDCs)                                            | 2021           | Policy               |
| D-D5     | Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation | 2014           | Action Plan          |
| D-D6     | Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation | 2014           | Action Plan          |
| D-D7     | Clean Development Mechanism (CDM) Policy                                              | 2011           | Policy               |

Table 4.1 presents the reviewed policies, plans and strategies which focus on climate change considerations directly. That means, their main focus is towards prevailing climate change issues within the country, and possible climate change mitigation or adaptation actions to overcome them by considering different sectors. These sources give an in-depth understanding of different perspectives of the ways of implementing climate change mitigation, climate change adaptation or both within the country.

Table 4.2: Policies, plans and strategies which indirectly focus climate change considerations

| Ref. No. | Name of the source                                                                                                                                       | Published year | Nature of the source |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------|
| I-D1     | National Action Plan for Haritha Lanka Programme                                                                                                         | 2009           | Action Plan          |
| I-D2     | National Environmental Policy                                                                                                                            | 2003           | Policy               |
| I-D3     | Sri Lanka National Agriculture Policy                                                                                                                    | 2007           | Policy               |
| I-D4     | Capacity Assessment and Action Plan for Developing Capacity for Compliance with Global Conventions on Biodiversity, Climate Change, and Land Degradation | 2007           | Action Plan          |
| I-D5     | National Policy on Disaster Management                                                                                                                   | 2010           | Policy               |
| I-D6     | National Action Program for Combating the Land Degradation of Sri Lanka                                                                                  | 2014           | Action Plan          |

|       |                                                |      |             |
|-------|------------------------------------------------|------|-------------|
| I-D7  | The National Housing Policy                    | 2017 | Policy      |
| I-D8  | National Biodiversity Strategic Action Plan    | 2016 | Action Plan |
| I-D9  | Country Partnership Framework                  | 2016 | Framework   |
| I-D10 | National Physical Planning Policy              | 2010 | Policy      |
| I-D11 | Sustainable Financing Strategy by Central Bank | 2019 | Strategy    |

The above Table 4.2 tabulates different policies, plans and strategies that focus on climate change considerations indirectly. Mainly, they are applicable for different sectors in Sri Lanka where climate change considerations have been included as a part of those policies, plans or strategies. How climate change issues affect the relevant sector and how climate change mitigation, adaptation or both can be implemented within those sectors were distinctly discussed in those documents.

#### **4.2.2 Key highlights of the reviewed documents**

The main factors and focuses of the reviewed sources were tabulated in a detailed manner as the key highlights of these sources. (refer Annexure I). The policies, plans and strategies which target climate change considerations directly and indirectly are presented separately with two different colours in this table.

#### **4.2.3 Linkages among the reviewed climate change policies, plans and strategies**

According to both literature and in-depth interview findings, it can be seen that different policies, plans and strategies are available in Sri Lanka which includes climate change considerations. Among them, several policies, plans and strategies focus on climate change considerations directly, mainly targeting climate change mitigation and adaptation within the country to overcome the current and future climate change challenges. At the same time, different sectorial policies, plans and strategies are also available that focus on climate change considerations as a part of their policies, plans and strategies. When considering both categories, many interrelationships can be identified among them which make the whole climate change policy network within the country stronger. In order to gain a distinct understanding of the possible barriers in implementing current policies, plans and strategies or future

sources which may be published based on the current ones, these interrelationships need to be properly understood.

As stated in D-D3, ratification of the Paris Agreement that builds upon UNFCCC can be regarded as one more step taken by Sri Lanka to commit to addressing climate-related issues. Consequently, building the resilience of vulnerable communities and ecosystems within the framework of sustainable development has become a major priority of the country. Recognising this responsibility, the government of Sri Lanka has launched different initiatives to cope with the adverse impacts of climate change where adopting the National Climate Change Adaptation Strategy for Sri Lanka (D-D2) in 2010 and the National Climate Change Policy (D-D1) in 2012 can be regarded as the major efforts of initiating such different steps. When considering about National Climate Change Policy (D-D1), it is mainly based on the UNFCCC and its Kyoto Protocol which takes global efforts to reduce the Greenhouse Gas (GHG) emissions within the framework of sustainable development, as mentioned in D-D1. Thus, it has been largely contributed in taking adaptive measures to avoid or reduce the impacts on livelihoods of the people and ecosystems while integrating climate change considerations into national development plans, as per D-D1 and D-D4. Added to this, developing the National Adaptation Plan (D-D3) can be identified as the next logical step that the country has taken in this direction. It also prepared along with the broad set of guidelines detailed in the UNFCCC towards the national adaptation plan development, as per D-D3. When developing the National Adaptation Plan in Sri Lanka, a country-specific methodology was adopted based on the broader guidelines set forth in UNFCCC. More importantly, National Adaptation Plan is fully consistent with the country's commitment towards global efforts for climate change adaptation. Overall, climate change adaptation is all about accomplishing the ultimate targets of sustainable development in the perspective of climate change, therefore, National Adaptation Plan invariably contributes to achieving the Sustainable Development Goals (SDGs). When developing the National Adaptation Plan, many other policies and plans were taken into consideration, even though their coverage of the subject area is not that comprehensive. National Action Plan for Haritha Lanka Programme (I-D1) is one of those sources. Despite its tendency to give more weight to climate change

mitigation measures, adaptation actions were also proposed under the areas of infrastructure vulnerability, land-use zoning, rain water harvesting, an increase of vectors and food security. Indeed, as explained in I-D8, it highlights national targets that are in line with global targets like SDGs while it is further consistent with National Action Plan for Haritha Lanka Programme (I-D1) which has a similar operational time period. Added to this, the National Action Programme for Combating the Land Degradation of Sri Lanka (I-D6) can be identified as another supporting document for the National Adaptation Plan which elaborates the actions to be performed to overcome the climate-related issues that can intensify land degradation of land resources in Sri Lanka. According to D-D3, since those proposed actions can complement the climate change adaptation, certain actions in both documents can be jointly implemented to achieve climate change adaptation. Moreover, National Physical Plan 2011-2030 (I-D10) is another action plan that can be assisted in achieving the objectives of the National Adaptation Plan to a certain degree because it has identified global warming as a critical issue that can affect the physical development of the country and has covered some aspects of disaster risk management.

Basically, the Paris Agreement is based on Intended Nationally Determined Contributions (INDCs) which focuses on both climate change mitigation and adaptation where Sri Lanka signed the Paris Agreement in 2016 and submitted its initial NDCs covering the commitments towards climate change mitigation and adaptation. According to D-D4, the Climate Change Secretariat started to update the NDCs with a more ambitious and robust assessment of mitigation and adaptation potential for the period of 2021 – 2030 to be submitted for UNFCCC prior to the 26<sup>th</sup> Conference of Parties. The updated NDCs are fully integrated and underpinned with the National Climate Change Policy of Sri Lanka (D-D1) which focuses on mitigation of and adaptation to the threat of climate change within the broader framework of sustainable development. During this process, desk reviews of initial NDCs submitted in 2016 were carried out by the relevant parties based on different policy documents, and sectoral master plans where National Adaptation Plan (D-D4) and Technology Needs Assessment for Climate Change Mitigation (D-D5) and Adaptation (D-D6) take key concern. When moving to Technology Needs Assessments for Climate Change

Mitigation and Adaptation, they can be identified as the major efforts taken to enhance the technical capacity of the country in terms of climate change mitigation and adaptation. Both documents have followed the procedures and guidelines recommended by UNFCCC to conduct Technology Needs Assessments for climate change in 2010, as stated in D-D5 and D-D6. D-D5 is mainly based on climate change mitigation component where a methodology was adopted to identify and assess the environmentally sound technological aspects that can be used to reduce the rate of GHG emissions as well as to contribute to low carbon emission investments within the country, while D-D6 is mainly based on climate change adaptation component.

The Clean Development Mechanism (CDM) Policy of Sri Lanka (D-D7) can be identified as a component of the National Climate Change Policy of Sri Lanka. (D-D1) where the initial Clean Development Mechanism (CDM) was introduced under the Kyoto Protocol to UNFCCC targeting reduction of GHG emissions. According to D-D7, although Sri Lanka is not a significant contributor to GHG emissions, one of the main objectives of the Sri Lankan government is to encourage the public as well as private sector investments towards climate-friendly activities while contributing to the achievement of the ultimate objective of UNFCCC. As stated in I-D4, initially, The Ministry of Environment has put a foot forward to establish two (02) CDM study centers at the University of Peradeniya and University of Colombo. Although some institutions have already engaged in climate change mitigation measures while contributing to this commitment, the National CDM Policy was prepared with the anticipation of forthcoming international support from CDM. In doing so, the preparation process of CDM policy was guided by the National Climate Change Policy of Sri Lanka (D-D1) and National Environmental Policy (I-D2) while complying with many other existing sectoral policy documents, as per D-D7.

The National Environmental Policy (I-D2) can be considered as one of the main policies which address climate change matters indirectly. By acknowledging the duty of every Sri Lankan to protect nature and conserve its resources, The National Environmental Policy was prepared to provide the direction and guidance to do so. The process of developing the policy was supported by many other sectoral policies,

plans and strategies. When considering about National Agriculture Policy (I-D3), it is intended to ensure the country's food security and nutrition security by increasing agricultural production through the adoption of sustainable farming systems and technologies. Some of the policy statements of this policy have recognised climate change as a key strategic area, covering irrigation and water management, land use, and soil conservation. This was used as a supporting document for preparing the National Adaptation Plan (D-D3) because it has a comprehensive portfolio of actions covering the areas of food security and water resources that can be applied in accomplishing the objectives of the National Agriculture Policy as well. Moreover, as explained in I-D11, mobilisation of public and private sector finance towards sustainability is highly paramount in implementing SDGs. In accordance with that, Sustainable Financing Strategy by Central Bank includes key actions to be performed to build an inclusive, economically, environmentally and socially sustainable world while contributing to achieve the SDGs.

On this premise, it can be identified that most of the available policies, plans and strategies are interconnected with each other with the aim of addressing climate change challenges through climate change mitigation and adaptation. The summary of the findings of the document review is illustrated in below Figure 4.1.

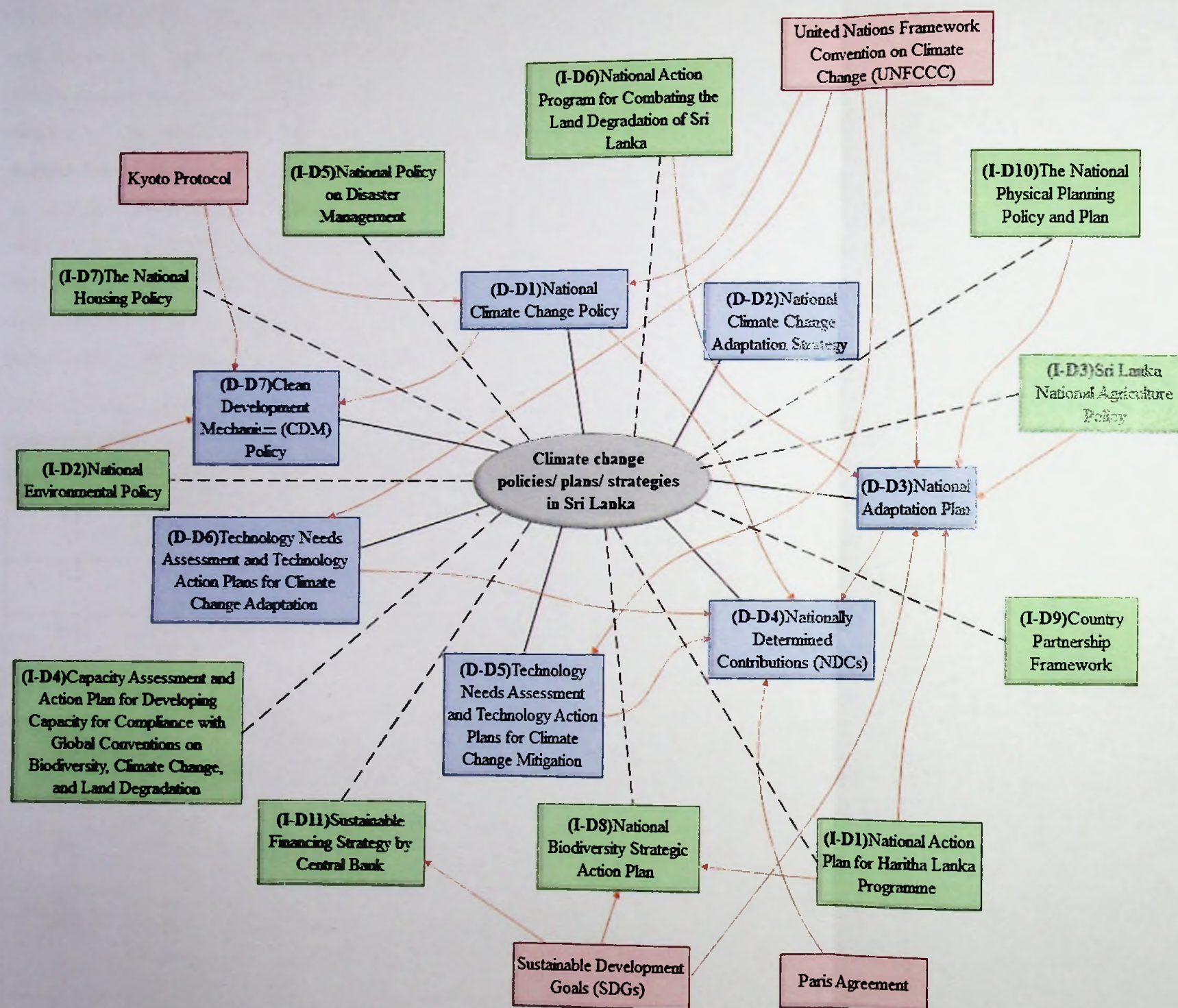


Figure 4.1: Summary of the findings of the document review

### 4.3Data analysis of in-depth interviews

Since it is intended to explore the climate change challenges facing today by Sri Lanka and barriers in implementing different policies and plans to overcome those challenges, different views of the experts who are involved in climate change policy making and implementation activities were highly acknowledged. Accordingly, thirteen semi-structured interviews were conducted with the experts who are involved in climate change policy making and implementation activities. The selected respondents were interviewed until the collected data got saturated. The profile of the respondents is presented in Table 4.3. As indicated in Table 4.3, the work experience of the respondents revealed their expertise and knowledge in the area of climate change policy making and implementations in Sri Lanka.

Table 4.3: Profile of the respondents

| Respondent | Designation                                                                                                                | Work experience (No. of years) |
|------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| R1         | Representative, International Union for Conservation of Nature (IUCN)                                                      | 35                             |
| R2         | Climate Finance Advisor, The Commonwealth Secretariat                                                                      | 17                             |
| R3         | Assistant Director, District Disaster Management Division                                                                  | 15                             |
| R4         | Senior Manager (Climate Change Adaptation and Resilience) of a non-profit organisation                                     | 18                             |
| R5         | Assistant Director, Disaster Management Center                                                                             | 12                             |
| R6         | Disaster Risk Management Specialist, World bank                                                                            | 21                             |
| R7         | Senior Lecturer specialised in Environmental Management                                                                    | 11                             |
| R8         | Senior Lecturer specialised in Sustainable Development                                                                     | 08                             |
| R9         | Professor specialised in Agricultural Engineering                                                                          | 36                             |
| R10        | Assistant Director of a Climate Project implemented by Ministry of Mahaweli, Agriculture, Irrigation and Rural Development | 18                             |
| R11        | Senior Lecturer specialised in Urban and Regional Planning                                                                 | 15                             |
| R12        | Development Officer at District Disaster Relief Center                                                                     | 11                             |
| R13        | Assistant Director, Climate Change Secretariat                                                                             | 20                             |

As per the views of the selected respondents, climate change challenges facing Sri Lanka, climate change mitigation and adaptation as the ways of overcoming those challenges, different policies and plans towards climate change mitigation and adaptation and barriers in formulating and implementing those policies and plans are discussed in a detailed way in below sub-sections.

### 4.3.1 Climate change challenges in Sri Lanka

Different climate change challenges which are currently experienced by Sri Lanka can be clustered under three main groups namely economic challenges, social challenges and environmental challenges, as identified in Section 3.4.1. A detailed description of each category is the basis for this section.

#### 4.3.1.1 Economic challenges

The below Figure 4.2 presents the coding structure derived through the NVivo software with regard to the economic challenges of climate change in Sri Lanka. The findings were further supported by the cognitive map presented in Figure 4.3.

| ⊕ Name                                               | Files | References |
|------------------------------------------------------|-------|------------|
| ⊖ ○ Climate Change Challenges                        | 13    | 127        |
| ⊖ ○ Economic Challenges                              | 13    | 46         |
| ○ Climate migration                                  | 4     | 5          |
| ○ Impact on agriculture sector                       | 12    | 19         |
| ○ Impact on energy consumption and energy production | 2     | 2          |
| ○ Impact on fisheries                                | 5     | 5          |
| ○ Impact on tourism sector                           | 2     | 2          |
| ○ Increase of government's expenses                  | 7     | 10         |
| ○ Reducing foreign exchange of the country           | 3     | 3          |
| ⊖ ○ Environmental Challenges                         | 13    | 42         |
| ⊖ ○ Social Challenges                                | 13    | 39         |

Figure 4.2: Coding structure for economic challenges due to climate change

According to Figure 4.2, seven (07) main challenges of climate change which make an influence on the national economy of the country were identified by the respondents. Among them, the **impact on agriculture sector** of the country can be viewed as the main challenge which was prominently identified by the respondents.

More specifically, 12 out of 13 respondents identified it as a major challenge experienced by the country today due to climate change. As per the views of them, the impact on the agriculture sector due to climate change has been created a spillover effect on the economy of the country because a significant population of Sri Lanka is depending on agriculture (A1, A2). Agriculture sector is very much linked with climate conditions where most of the decisions were taken by the people who are involving in these activities based on the climate conditions like rainfall patterns and temperature levels, as opined by R11 and R13 (A3). However, today many difficulties have arisen when taking such decisions due to the changes in climate. For example, R11 mentioned that *"...the rainfall patterns have been changed largely today than past. So, the farmers cannot predict what is the best time to cultivate due to unpredictable rainfall patterns"* (A4). This has impacted on the effectiveness of food production to go down. Further, as strongly viewed by many of the respondents, the yield can be significantly reduced with the changes in climate (A5). For example, R2 stressed that *"...some crops need a certain level of temperature. When the temperature level changes increasingly, the yield of those crops can be reduced"*. At the same time, the quality of the crops also can be considerably reduced due to the changes in climate, as mentioned by R1 and R2. Supporting this view, R1 mentioned that *"Different diseases can be there among the crops due to the temperature rise. For example, some viruses and bacteria can be spread. The new ones also can be generated with the changes in temperature. It can lead to a reduction of quality and quantity of yield"*. Also, as noted by most of the respondents, different disaster situations can occur due to climate change like floods, droughts, landslides etc. where such situations can lead to a lot of damages for the agriculture sector. R5 mentioned that *"We had experienced the prolonged drought in 2014 and the vegetable cultivations were extremely less at that time period"*. As further added by R5, due to the critical impacts on agriculture due to climate change, the food chain can get largely impacted. When the products are not coming to the market on time, the whole production system can be impacted, the supply of products can be reduced, customers get dissatisfied and thereby the whole food chain can be impacted (A6). In this context, it is evident that the impact on the agriculture sector has become a critical challenge towards the country's economy urging the necessity of taking prompt actions for them. In fact, this situation can lead

to loss of livelihoods of the people largely because the majority of the rural population in Sri Lanka depends on agriculture. Hence, the country is facing a notable societal challenge due to the impact on the agriculture sector. This was discussed in a detailed manner in Section 4.3.1.2.

The second critical economic challenge identified by the respondents is **increase of government expenses**. It was identified by seven (07) respondents out of 12. As stressed by them, the government's expenses can be increased in a number of ways due to climate change. R8 noted that *"Property damages largely happen due to disasters. The government has to rebuild, maintain and repair the damaged properties. It can make an additional cost for the country. Since the government is currently suffering from many financial issues, this additional cost can make huge challenges for the country"* (A7, A8). R10 also agreed with this view and added that during the disaster situations like floods, landslides, droughts etc., the government has to pay subsidies in a large manner for the affected people which creates an unbearable cost for the government in a situation with a lack of funds (A9). Furthermore, a critical impact can occur on the people's health due to climate change and the government has to pay more for the health concerns of the people, as per R8, R11 as well as R13. It also increases the government's expenses substantially (A10). Accordingly, being a developing country, Sri Lanka is economically suffering a lot due to the increase of government expenses in many ways as a result of climate change issues. **Impact on fisheries** was identified by several respondents as another critical challenge that can make a vast influence towards the national economy of the country. As disclosed by R4, fisheries also contribute to a considerable amount of food production of the country. Hence, the impact on fisheries has been created a significant challenge in this direction (A11, A12). Since sea-level rise is increasingly happening today in many coastal areas of the country (as identified in Section 4.3.1.3), a significant risk can be identified towards fisheries. R12 stressed that *"...fisheries have been impacted more due to many climate-related issues like coastal erosion, temperature changes in sea water, salinity intrusion etc. So that the country's food security gets impacted badly"* (A13). This situation also directs to loss of livelihoods remarkably (as discussed in Section 4.3.1.2). The majority of the people who reside in coastal areas mainly depend

on fisheries where it is the sole income source for most of them. When the fisheries get impacted extremely due to climate change, the dependency of these people on fisheries makes them more vulnerable to uncertainties and risks involved including loss of livelihoods.

**Climate migration** was captured by five (05) respondents as another growing challenge due to climate change in Sri Lanka. As opined by them, loss of livelihoods of the people is happening significantly within the country as one of the prominent social challenges of climate change (as discussed in Section 4.3.1.2). R10 commented that *“As a result of these losses of livelihoods, labour migrations have been increased in Sri Lanka today. That means the people who lose their livelihoods are migrating to other areas of the country as well as other countries for many other jobs”* (A14, A15). Supporting this view, R4 added that *“...for example, majority of the people who are doing agriculture in rural areas have been tended to migrate to urban areas, seeking jobs due to the adverse impacts they have to face in their livelihoods”* (A16). However, R13 insisted that many other problematic situations faced by the people in their day to day life can affect climate migration in line with the adverse impacts of climate change. Hence, climate change can be regarded as one of the key reasons for the migrations of people. As strongly viewed by all the respective respondents, presently, this labour migration is increasingly happening within the country (A17). Indeed, it can lead to a number of social issues as well. When the people lose their livelihoods and tend to migrate to other areas or other countries, the other members of their families may have to face different social issues like safety issues for the women and children, psychological issues, economic difficulties to maintain their lives etc. This was discussed in an exhaust manner in Section 4.3.1.2.

**Reduction of foreign exchange of the country** can be regarded as another challenge that can make considerable stress to the economy of the country. As discussed previously, although Sri Lanka is a fertile tropical land with a significant potential for cultivations, a number of climate-related issues hamper the growth of the sector. At the same time, the agriculture sector can be regarded as one of the main export-oriented sectors within the country, as agreed by all the respective respondents (A18). Since the

agriculture sector has been influenced critically due to climate change, the export economy has also been critically impacted, as commented by R8. As a result, the foreign exchange of the country has been reduced largely (A19). By further strengthening this view with an example, R4 revealed that “...*the prevailing evidence showed that the tea cultivation has been impacted by climate change rather than before with the increased changes in temperature levels. So, the foreign income gained from tea exporting has been largely reduced*”. Accordingly, it is true that climate change has been created a significant loss in foreign exchange in Sri Lanka, leaving the export economy in an enormous threat.

Two similarly important economic challenges due to climate change were explored by the respondents as the **impact on tourism sector** and **impact on energy consumption and energy production of the country**. As noted by R5, the tourism sector has been earmarked as one of the most vulnerable sectors for climate change since the majority of the tourism industry has been established along the coastal areas of the country. In fact, coastal areas are highly experiencing a number of climate change issues such as sea-level rise, coastal erosion, salinity intrusion etc. (as identified in Section 4.3.1.3). Therefore, the biodiversity of the coastal environment can be impacted heavily and the beauty of the coastal environment can vanish, as per R5 as well as R8 (A20, A21). Hence, the beautiful destinations which attract tourists can be reduced leaving the productivity of the tourism sector less in performance (A22). Indeed, this situation also leads to the reduction of foreign exchange of the country because the tourism sector can be regarded as another prominent foreign exchange earner in Sri Lanka. Similarly, the energy consumption patterns, as well as energy production of the country, have been heavily impacted due to climate change. R2 commented that “...*droughts have created a lot of implications on our energy production. For example, when there are prolonged drought events, the hydropower capacity can be reduced. Then we need to import a lot of coal and oil for our energy productions*” (A23). Added to this, energy consumption patterns also can be influenced in many ways due to climate change, as noted by R12 (A24). For instance, temperature levels have been changed largely today than before due to climate change and an increase in temperature is likely to enhance the peak electricity demand within the country. Such situations exacerbate the critical

need for finance as a country which will affect the overall economic development of the country adversely. Hence, it can be identified as another crucial economic challenge to be mitigated.

By considering the above, it is proven that Sri Lanka is severely suffering from a number of economic challenges due to the changes in climate which are increasing day by day. Based on the respondents' perceptions, the threat towards the country's economy due to climate change is exceedingly large than in past where a way of overcoming them is crucially in need.

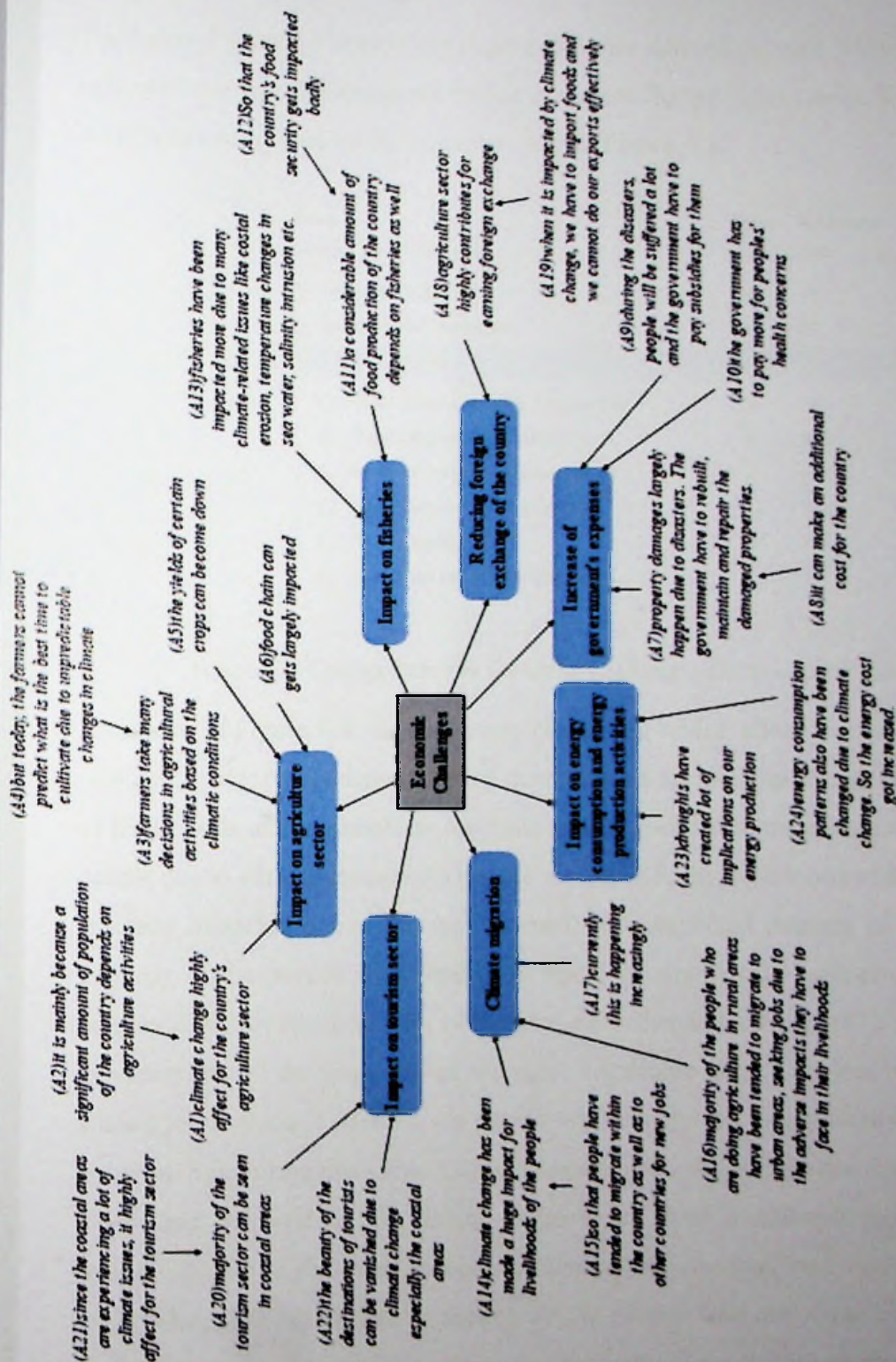


Figure 4.3: Cognitive map for economic challenges

4.3.1.2 Social challenges

The below Figure 4.4 depicts the coding structure derived through NVivo software to indicate the social challenges arisen due to climate change in Sri Lanka. The discussion was further supported by the cognitive map in Figure 4.5.

| ⊕ Name                                 | ▲ Files | References |
|----------------------------------------|---------|------------|
| ⊖ ○ Climate Change Challenges          | 13      | 127        |
| ⊖ ○ Economic Challenges                | 13      | 46         |
| ⊖ ○ Environmental Challenges           | 13      | 42         |
| ⊖ ○ Social Challenges                  | 13      | 39         |
| ○ Health issues among the communities  | 9       | 10         |
| ○ Impact on living standards of people | 6       | 9          |
| ○ Issues for marginalized communities  | 4       | 4          |
| ○ Loss of livelihoods of the people    | 12      | 12         |
| ○ Psychological issues                 | 3       | 3          |
| ○ Unexpected situations for people     | 1       | 1          |

Figure 4.4: Coding structure for social challenges due to climate change

As shown in Figure 4.4, six (06) main challenges which affect human society were captured by the respondents. Among them, almost all the respondents identified **loss of livelihoods of the people** as the most critical social challenge experienced by the people due to climate change. As per the view of R5, the livelihoods of the people are crucially impacted due to the rapid as well as unexpected changes in climate. The majority of the people who depend on micro or small-scale businesses are highly vulnerable to this situation most of the time, as further added by R5 (S1). Accordingly, as viewed by all the respondents, the most vulnerable parties for loss of livelihoods among these climatic victims are people who depend on agricultural activities and fisheries. Supporting this view, R9 mentioned that “...people who are living in coastal areas and involved in the fishing industry as their livelihoods may lose their livelihoods due to different changes in climate like sea-level rise, extreme rainfalls etc.”. Also, R12 noted that “...especially the people who are living in rural areas mainly depend on agriculture. When the cultivations get destroyed due to flooding, droughts or any other extreme weather event in each year, their livelihoods may definitely get lost” (S3). Thus, it is obvious that a tremendous effect has been occurred

towards the livelihoods of a significant amount of the country's population due to climate change. When the livelihoods of the people get impacted, the income of their families also get critically impacted and thereby they have to face many economic difficulties in their lives, as per R11 as well as R7. Indeed, this situation can exacerbate climate migration significantly. R2 highlighted that *"...when people lose their livelihoods, they are forced to find other options as their livelihoods which might lead to temporary or permanent migrations/ displacements"* (S4). Actually, it is obvious through this statement that the increase of more suffered people due to climate change can considerably happen as quoted by the respondents under the challenge of impact on living standards of the people (S9).

The next critical challenge identified by nine (09) respondents out of 13 is the occurrence of **health issues among the communities**. As identified by all the respective respondents, climate change threatens human health in many ways. R1 commented that a number of diseases can be spread among the communities at a higher rate due to climate change, especially during the disaster events such as floods, droughts, and landslides (S5). For instance, a high possibility of occurring diseases like Dengue, water-borne diseases etc. can be identified when there are increased rainfalls for a particular time period. Agreeing with this view, R13 mentioned that pests can be highly spread leading to different health problems for the people during disaster situations. Moreover, R3 highlighted that existing health issues may intensify while new health issues are emerging as a result of adverse changes in climate (S6). Added to this R8 mentioned that *"...people who live in urban areas can get safe water while the majority of the people who live in rural areas are consuming unsafe water because the quality and quantity of water resources have impacted due to climate-related issues like flooding. So, different types of diseases can be spread among people due to unsafe water. Kidney diseases are the most common among them in Sri Lanka"* (S7). Actually, water pollution can be regarded as one of the main environmental challenges due to climate change (as identified in Section 4.3.1.3) and it leads to a number of health issues among the communities. Furthermore, climate change and resulted erratic disaster events cause deaths and disabilities largely each and every year. For instance, R12 disclosed that a number of deaths are reported annually due to

floods and landslides in Sri Lanka in different districts like Ratnapura, Kalutara, Badulla etc. (S8). More importantly, the severity of these health issues mainly depends on the ability of the people to address or prepare for such changing threats. In a such situation, the occurrence of health issues may adversely affect the poor people with less income levels mostly where Sri Lanka is extremely suffering from such situations as a country that is still developing. Accordingly, it is evident that climate change together with other health stresses influences peoples' health in numerous ways.

**Impact on living standards of the people** can be regarded as another social challenge captured by several respondents. In here, the main focus was given by the respective respondents for the increase of poverty within the country. Due to the major impacts towards peoples' livelihoods, properties, lives and so on, the social gap between the people can be increased, as per R8. For example, when there are property losses due to different disasters, the people who earn more can somewhat manage their property losses however the people who earn less can't manage the situations successfully (S9, S10). So that, it leads to certain inequalities among the people. R2 highlighted that *"...the gap between the people who have and who have not can be highly increased due to the climate change impacts"* (S11). Being a developing country, Sri Lanka is significantly suffering from such social inequalities and this situation has the potential to further worsen with the increased occurrence of changes in climate. At the same time, most of the poor people who are highly vulnerable to climate change may face different problematic situations in their families largely leading to significant changes in their living patterns, as pointed out by R8. Indeed, this situation can be further exacerbated by the challenges of loss of livelihoods and the occurrence of health issues which was identified previously. According to R12, when the livelihoods get impacted and income is reduced, the children may have to face difficulties in their education while women have to face many economic difficulties in maintaining their lives (S12, S13). Moreover, R10 asserted that unnecessary competition among the people can occur due to the societal gap created among them by the climate change challenges. Agreeing with this view, R11 commented that *"...when people are getting more and more difficulties in their lives, some kind of unstableness of the society can occur among the people who have and who have not. Sometimes, such situations may cause*

*different conflicts as well*” (S14, S15). Accordingly, it is apparent that a rising impact has been occurred towards the peoples’ living standards due to the devastating changes in climate.

Another critical challenge to be focused on in Sri Lanka is **issues related to marginalised communities**, as captured by several respondents. According to them, the impacts of climate change are distributed differently among different age groups, genders, generations etc. R1 revealed that “...*women are the worst affected party due to the security issues and hygiene issues during any kind of disaster situation*” (S16). The same idea was brought forward by R2 and R3 as well stating that the challenges arisen due to climate-related issues are much harder for women in many ways. The same situation can be observed when it comes to children as well. As asserted by R4, children may be highly susceptible to a number of issues including safety issues and food security issues during disaster situations (S17). For instance, R4 noted that “...*in an event of a flood, people have to move to safer places. In such situations, different issues can happen for children due to food security issues safety issues etc.*”. The issues for these marginalised communities, especially for women and children can be extremely increased due to the loss of livelihoods as identified before. The abilities to respond to the threats that climate change poses for their lives are completely different making the situations more critical. In addition, the said statements (S16) and (S17) can relate to the challenge of ‘unexpected situations for people’ as well which will identify within the rest of the discussion. Therefore, issues for such marginalised communities can be regarded as another crucial challenge to be mitigated. In line with the above-mentioned challenges, another challenge was captured as the **occurrence of psychological issues**. As stressed by R1, when there is any kind of disastrous situation due to climate change, these psychological issues are very common for women and children most of the time. Supporting this view, R3 highlighted that “...*if any disaster like drought, flood or landslide occurs, it leads a family to evacuate to a particular place for the safety. Then there are a lot of social challenges like safety issues, hygiene issues etc. Such issues can create different psychological disturbances for the people, especially for women and children*”. Not only that, as strongly viewed by R2, the majority of the people are socially disturbed when their livelihoods and living patterns

have become completely challengeable (S18). Indeed, this statement can relate with the statement under the challenge of 'impact on living standards of the people' which says when the people face more difficulties, social unstableness can happen (S15). Therefore, many psychological issues can arise among such people. Hence, it can be seen that these psychological issues have been created significant obstacles in people's lives. Added to this R10 identified another social challenge in this regard which is the **possibility of occurring unexpected situations for the people**. R10 was in consensus that people may have to face different unexpected incidents most of the time due to climate change. For example, *'...some drainage systems, tank systems, protection walls of canals have been designed in some areas a long time ago by considering the climate situations at that time period. But today rainfall patterns, temperature levels and many other impacts occur unexpectedly with high intensity and severity than before. So, such kind of designs may not adequate today and as a result, sudden disasters like sudden flood events can occur'*, as per R10. Since people may not have any previous experience in this regard, such incidents can create many unexpected situations to be faced. Those situations may worsen based on the responding capacity of the vulnerable people for such situations. When a group of people who are mainly depending on agriculture has to face such an unexpected incident, definitely they get disturbed economically, mentally, socially and so on due to a lot of negative impacts.

From the discussion, it is apparent that the majority of the population of the country is severely suffering from the adverse changes in climate that are increasingly happening today. Being still a developing country, Sri Lanka poses a high possibility of worsening these social issues in the future with the absence of proper ways to overcome them.

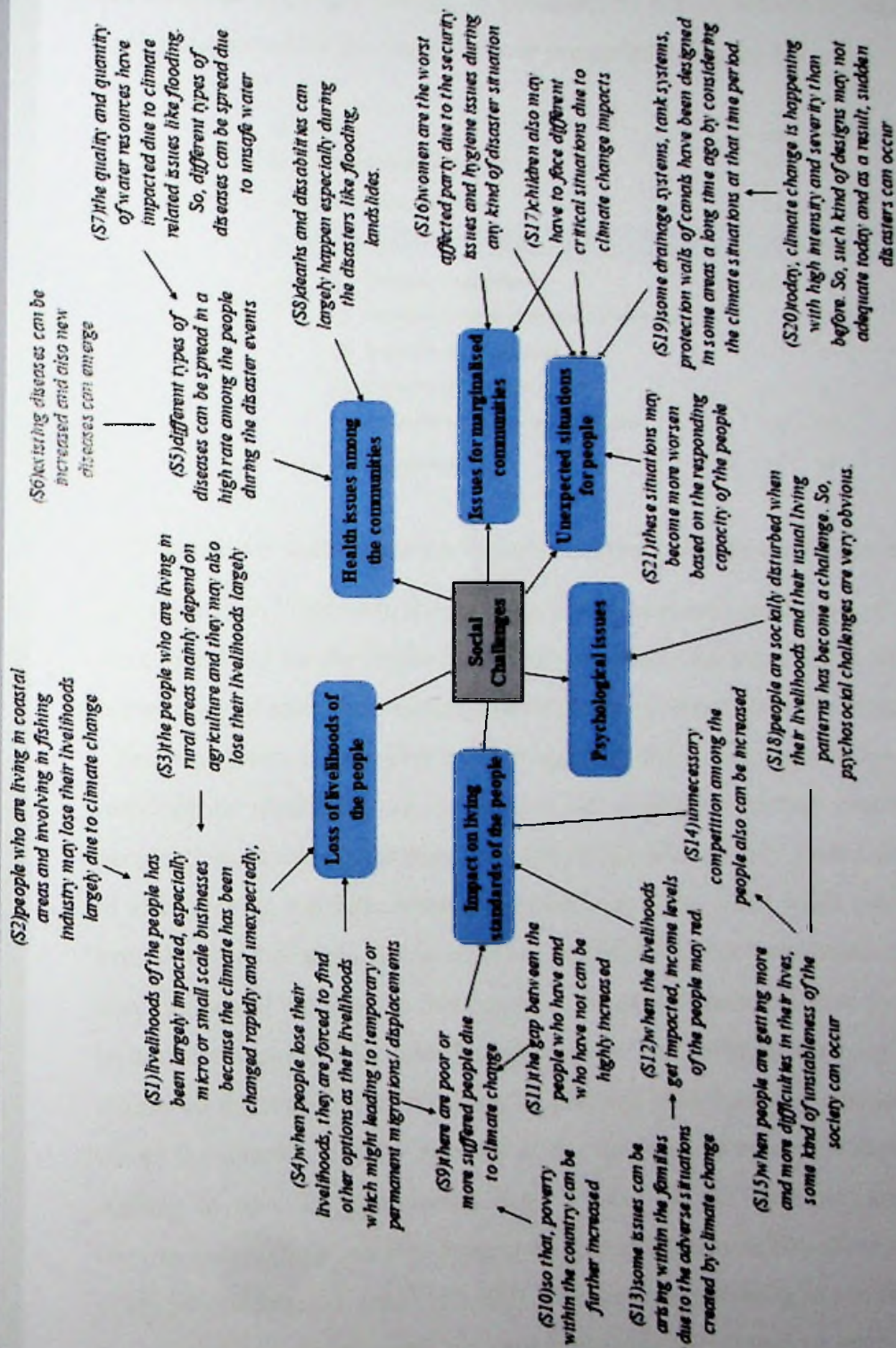


Figure 4.5: Cognitive map for social challenges

4.3.1.3 Environmental challenges

The below Figure 4.6 presents the coding structure for environmental challenges that can arise due to climate change, as generated by NVivo software. The discussion was further supported by the cognitive map presented in Figure 4.7.

| ⊕ Name                                         | ▲ Files | References |
|------------------------------------------------|---------|------------|
| ⊖ ○ Climate Change Challenges                  | 13      | 127        |
| ⊖ ○ Economic Challenges                        | 13      | 46         |
| ⊖ ○ Environmental Challenges                   | 13      | 42         |
| ○ Changes in ecosystem                         | 9       | 10         |
| ○ Impact on thermal comfort of the environment | 2       | 2          |
| ○ Impact on water resources                    | 7       | 8          |
| ○ Impacts on biodiversity                      | 8       | 9          |
| ○ Occurence of extreme weather events          | 12      | 13         |
| ⊖ ○ Social Challenges                          | 13      | 39         |

Figure 4.6: Coding structure for environmental challenges due to climate change

As indicated in Figure 4.6, five (05) main environmental challenges of climate change were identified by the respondents. Among them, the main focus was given to the **occurrence of extreme weather events** as the most critical environmental challenge, where a majority of the views were given by all the respondents in this regard. All the respondents identified the occurrence of extreme weather events in different perspectives. According to them, the climate has been already altered and will continue to alter making too little water is available in some areas while too much water is available in other areas. Some areas are subject to all these conditions during different time periods of the year. In this context, one of the major extreme weather events to be aimed at today in Sri Lanka is changes in rainfall patterns, as strongly suggested by almost all the respondents. The rainfall patterns have been changed largely than past where the intensity and the severity of the rainfalls have become steadily increased. Adding to this, R5 commented that “...most of the time, we are experiencing unexpected rainfalls and they bring a number of disastrous situations for the majority of the people in many ways” (E1, E2). The increased severity of the rainfalls leads to disastrous flood events where the country has been experienced several flood events

annually with a number of negative impacts, as per all the respondents. R11 mentioned that districts like Ratnapura, Kalutara, Colombo are always suffering from severe flood events each year resulting in vast damages for human lives, properties, agriculture and so on. Moreover, R1 noted that “...*the rainfalls with high intensity can lead to high erosion rates, especially in upcountry leading to disastrous landslides as well*” (E3). By further adding to this, R1 highlighted that high erosion rates resulted from increased rainfalls can cause filling up the reservoirs and the other water resources with silt and thereby the quality and the quantity of the water resources can be acutely impacted (E4, E5). Accordingly, the views of the respondents revealed that it is much more difficult to predict the rainfalls today due to the absence of an exact and clear pattern of it. Changes in temperature levels can be regarded as another extreme weather event as captured by all the respondents. According to them, the ambient temperature has been increased largely today directing to prolonged droughts within the country. Since the possibility of becoming the dryer areas more dryer is exceedingly high due to the extreme changes in temperature levels, many areas of the country are significantly vulnerable to droughts, as indicated by R11 (E6, E7). At the same time, temperature rising can acutely affect the agriculture sector as well, as discussed under Section 4.3.1.1. When the required temperature levels change, the quality and the quantity of yields can be reduced largely leaving the food production of the country at a huge threat. Similarly, when the temperature levels of sea water get rise, sea-level rise can happen which was identified as another extreme weather event by many of the respondents. As strongly suggested by R2, R3, R5, R6 and R11, sea-level rise is increasingly happening today in some of the coastal areas of the country bringing the adverse impacts drastically (E9). R1 was on par with that view stating that “...*sea water intrusion can happen due to the sea level rise. As a result, the ground water in coastal areas can become polluted. It is already happening in the areas like Kalutara, Jaffna*” (E10). Indeed, this situation can affect the drinking water availability severely in most of the coastal areas resulting in different social issues (as identified in Section 4.3.1.2) such as spreading different diseases, unnecessary competition among the people for safe water and many other economic impacts as well. At the same time, as ascertained by R3 and R6, some increase in cyclones also can be seen today than before in Sri Lanka due to climate change which has the potential to further increase in the

future. Hence, it also can be regarded as another aspect of occurring extreme weather events.

**Changes in ecosystems** can be identified as another major environmental challenge that can arise due to climate change, as captured by eight (08) respondents out of 12. R4 stressed that *“Ecosystems can be highly damaged due to climate change. For example, environmental systems like coral reefs, kadolana have been impacted largely today with the changes of climate”* (E12). Supporting this view, R6 also asserted that when there are disasters like flood events, the wetlands and other environmental systems can get flooded making adverse impacts towards their ecosystem levels. Such situations can make a spillover effect towards different industries as well, as per R7 (E13, E14). For instance, according to R7, when the coral reefs exposed to increased temperature levels, coral breaches can happen which can affect for fisheries sector largely by reducing fish habitats and thereby reducing their harvest. Hence, changes in the ecosystem may lead to many economic impacts as well, as discussed in Section 4.3.1.1. Further, rapid changes to ecosystems may cause different displacements or loss of many kinds of species, as per R1. To date, a lot of migrations of animals and many other species can be seen due to this situation where human-elephant conflicts can be considered as an obvious example of the adverse impacts due to such migrations. Together with this challenge, another challenge was explored by eight (08) respondents out of 13, which is **impacts on biodiversity**. As identified by all the respective respondents, Sri Lanka is experiencing rich biodiversity that produces a rich array of benefits, however, we may lose it increasingly due to the adverse changes in climate (E16). From the past, Sri Lanka exhibits a remarkable diversity of forests, however, currently experiencing a loss of large area of forestry each year, as opined by R3. As a result, biodiversity has been severely impacted (E17). According to R6, different types of species will vanish in the future when their required levels of comfort get changed due to climate change. Added to this, living patterns and habitats of the species can be exceedingly impacted leaving their natural existence in a considerable threat, as per R11. Also, a wide variety of fauna and flora, especially those endemic to the country, will be vanished with the continuous impacts of climate change. In such ways, the loss of the whole biodiversity is increasingly happening hampering the

ecosystem services which play a pivotal role in human lives. More importantly, the loss of biodiversity can make a negative influence towards the tourism sector as well leading to many economical threats as discussed in Section 4.3.1.1.

In line with the previously identified challenge, another main challenge can be identified as the **impacts on water resources**, as per the views of six (06) respondents. R8 noted that although Sri Lanka has an abundance of water for all its needs, depending on the area, climate change has been widely made differing impacts on water resources within the country. Accordingly, both surface and ground water has been impacted largely today due to climate change (E20). Agreeing with that view, R7 asserted that in areas like Jaffna, where prolonged droughts can be seen, ground water pollution can be commonly visible as a result of those droughts. As per the views of R1 and R9, water pollution can be resulted not only due to droughts but also floods as well (E21). At the same time, R6 added that “...*salinisation is increasingly happening in different coastal areas like Kalutara affecting both surface and ground water of those areas*”. Accordingly, it is obvious that a marked effect can occur towards water resources due to the erratic disaster situations resulted from climate change. When the water resources get polluted increasingly in different areas, people have to face a number of social issues in their lives such as drinking water shortages, the spread of different diseases, unnecessary competition among the people etc., as highlighted by R6 (E22, E23). Those challenges were discussed comprehensively in Section 4.3.1.2. As further insisted by R6, compared to the past, the drinking water shortage has become a big issue today in some areas of the country. At the same time, since climate change has been tended to reduce the quality and quantity of water resources considerably, a vast impact has been occurred towards agricultural activities as well, which was previously identified as a significant economic challenge in Section 4.3.1.1 (E24). Ultimately, it may influence the livelihoods of the people. Hence, it is true that the impact on water resources can become a root cause for different social as well as economic challenges. Another significant challenge captured by R2 and R7 is **impact on thermal comfort of the environment**. When the temperature levels exceedingly change, heat levels of the environment can also change over the satisfactory level, as per R2. As a result, the thermal comfort of the environment can be reduced largely

(E25). By further strengthening this fact, R7 mentioned that “...*as an example, in Northern areas of the country, the thermal comfort of the environment has become less with the increase of temperature levels*”. In consequence, people may have to face many difficulties mainly relating to their health, as discussed more in Section 4.3.1.2. In this context, the views of the respondents revealed that a number of environmental challenges also can occur to an increasing extent leaving the humans, animals, and whole ecosystem services at a greater risk.

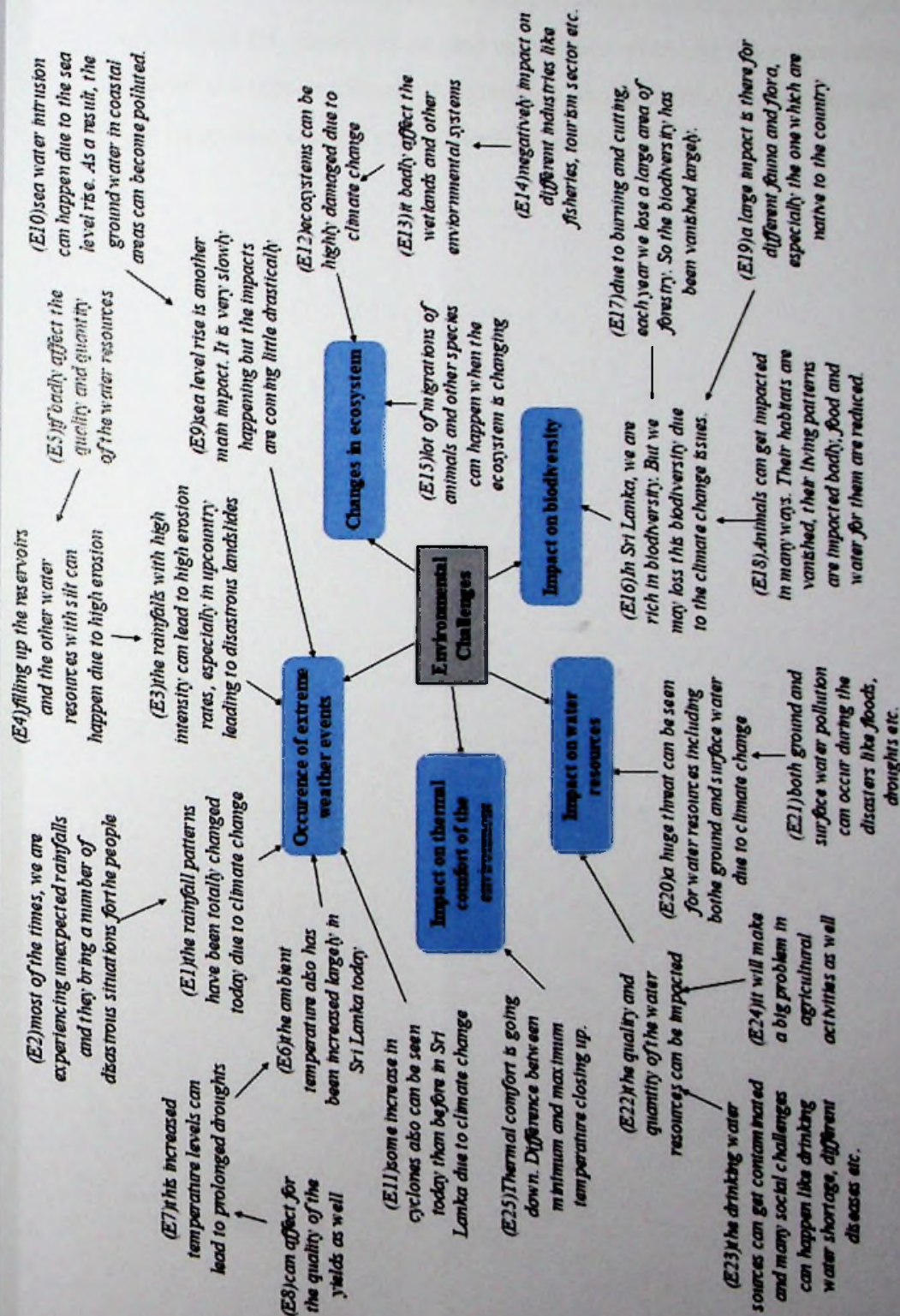


Figure 4.7: Cognitive map for environmental challenges

By looking into the above discussion, it is evident that the investigation has arrived at a number of challenges posed by the adverse climate change impacts in Sri Lanka economically, socially and environmentally. Furthermore, the analysis of the findings exposed that the three categories of climate change challenges linked together in many ways making the possibility of their occurrence more and more unavoidable with the increased changes in climate. Accordingly, the identified climate change challenges under three main clusters are succinctly depicted in Figure 4.8.

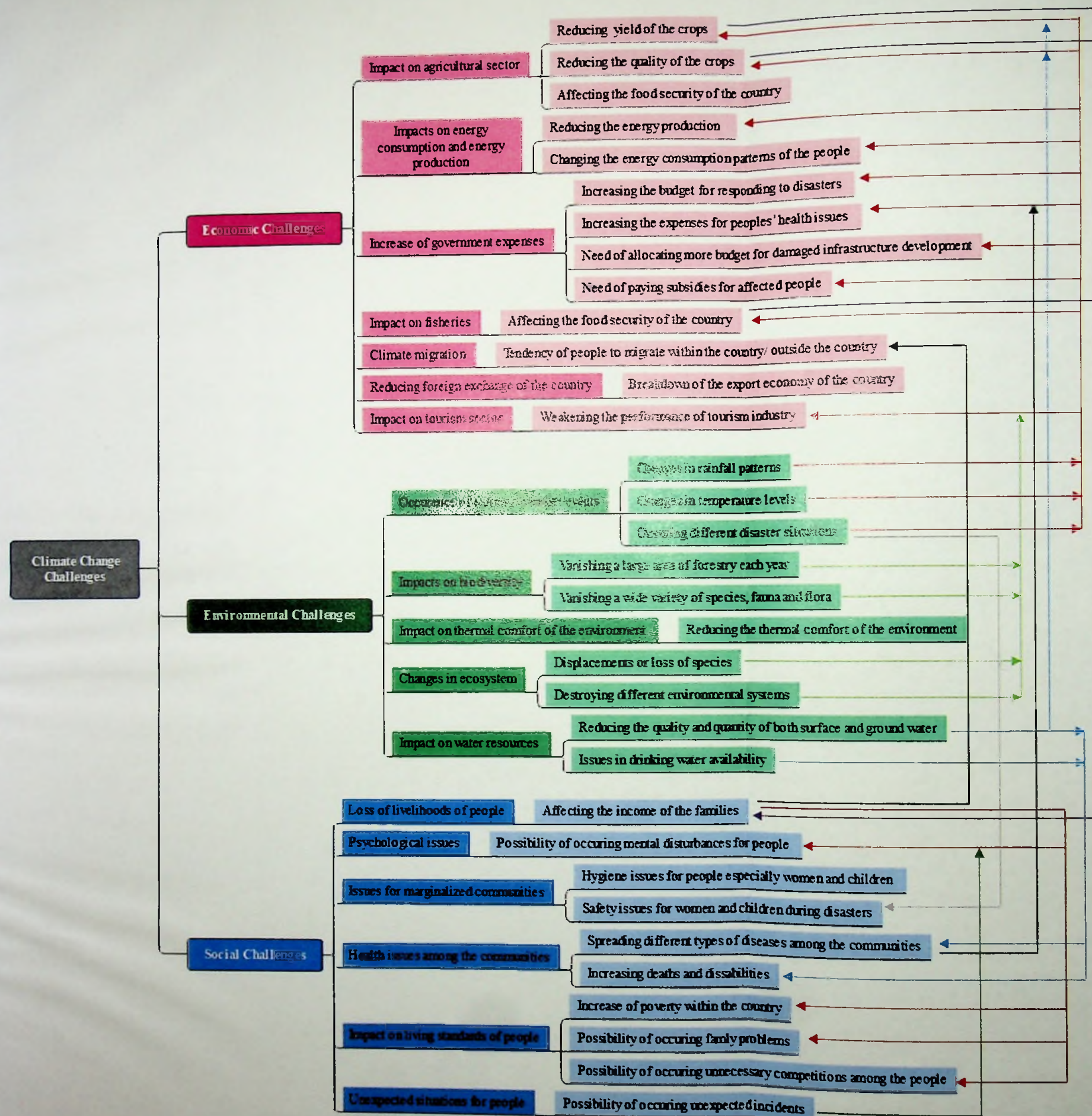


Figure 4.8: Climate change challenges in Sri Lanka and explicit linkages among them

Figure 4.8 presents the identified different challenges posed by climate change impacts in Sri Lanka today. As depicted through Figure 4.8, those challenges can be distinctly identified under three (03) main categories as economic, social and environmental challenges. At the same time, the actual issues prevailing under each and every challenge were captured through further exploration. Accordingly, seven (07) economic challenges, five (05) environmental challenges and six (06) social challenges were extensively identified. In addition, as per the findings, these challenges are not standalone issues where one challenge can be a reason for the emergence of another type of challenge. Accordingly, the explicit linkages among the identified climate change challenges were captured through the data analysis and they were also presented clearly in Figure 4.8. On the whole, a broad understanding can be gained on prevailing climate change challenges in Sri Lanka through the above discussion.

#### **4.3.2 Future challenges due to climate change**

Several issues which have the most significant capacity to further increase in the future were identified by the respondents as the most critical future challenges due to climate change.

One of the most critical future challenges identified by the respondents R1, R5, R6 and R10 is the possibility of increasing the occurrence of extreme weather events. As notably identified in Section 4.3.1.3, extreme weather events are already happening steadily more today with the high potential to further increase in the future. As commented by all the respective respondents, the intensity and severity of these extreme weather events including rainfall patterns, disasters like floods, landslides etc. will highly increase in the future. More specifically, R1 highlighted the increased possibility of occurring cyclones in the future as another extreme weather event to be focused on explicitly. As per the view of R1, Sri Lanka is already experiencing cyclones up to some extent where the situation can become worse in the future with the acute changes in climate which are looming day by day. Similarly, the increased occurrence of sea-level rise also can be regarded as another extreme weather event that has the high potential to further increase in the future, as stressed by R1 as well as R10.

Presently, it is slightly happening in some areas of the country, however, will increase more in the future with the continuous changes in climate. More importantly, R10 disclosed that the vulnerable population of the country will be highly increased in the future due to the significant possibilities of occurring more and more extreme weather events. It will become a great economic challenge for a country like Sri Lanka, which is still developing because a crucial necessity of huge investments will be in need in order to reduce the vulnerabilities of the people. At the same time, since the development processes are growingly happening today within the country with the increased urbanisation, the economic loss that the country will have to face in the future can be unquestionably increased. R5 further strengthened this view stating that *"...the roads, bridges and building developments are largely happening today in most of the areas in the country and the possibility of occurring property damages in an event of a flood can be increased"*.

Added to this, impacts on water resources can also be further amplified in the future leading to many more social and economic impacts, as captured by R2, R6 and R8. According to them, although Sri Lanka is rich with surface and ground water availability, the quality and quantity of these water resources have already been crucially impacted up to some extent and will continue in the future as well. Hence, the availability of safe water for people can become a great threat in the future. A similar situation can be observed when it comes to food security as well, as stated by R4, R8 and R11. R8 asserted that *"when it comes to food security, it can be a huge challenge in future within the country. If the agriculture sector will be impacted largely in future due to climate change, definitely food security will become a challenge"*. Supporting this view, R11 also mentioned that *"...for now as well, food security has been impacted heavily due to climate change and the situation will become worse in future for sure"*. Thus, increased impacts towards food security can be identified as another future challenge in this regard. Increased occurrence of climate migration can be another critical challenge in the future, as strongly viewed by R1, R4 and R13. At present, it is happening up to some extent especially for several particular sectors, as per R1. For example, climate migrations are mostly common in the tea cultivation sector today since the cultivation activities have been extremely impacted by climate

change and thereby the yield has become severely reduced. However, this situation will become a great threat in the future for other sectors as well with the increased changes in climate. As a result, the possible societal challenges may also further increase where social inequalities may exacerbate more and more. Moreover, the possibility of occurring more health issues among the communities was also captured by R12 as another future challenge. Indeed, the existing health issues may further intensify while different new diseases also may emerge leading to many disastrous situations for people. With the rapid and unexpected changes in climate, the natural processes of the environment may moderate, becoming major causes for unknown diseases.

Accordingly, it can be seen that the aforementioned situations can become the worst challenges in the future due to climate change, widely affecting the country's economy, society as well as natural environment. A summary of the future climate change challenges is presented in Figure 4.9.

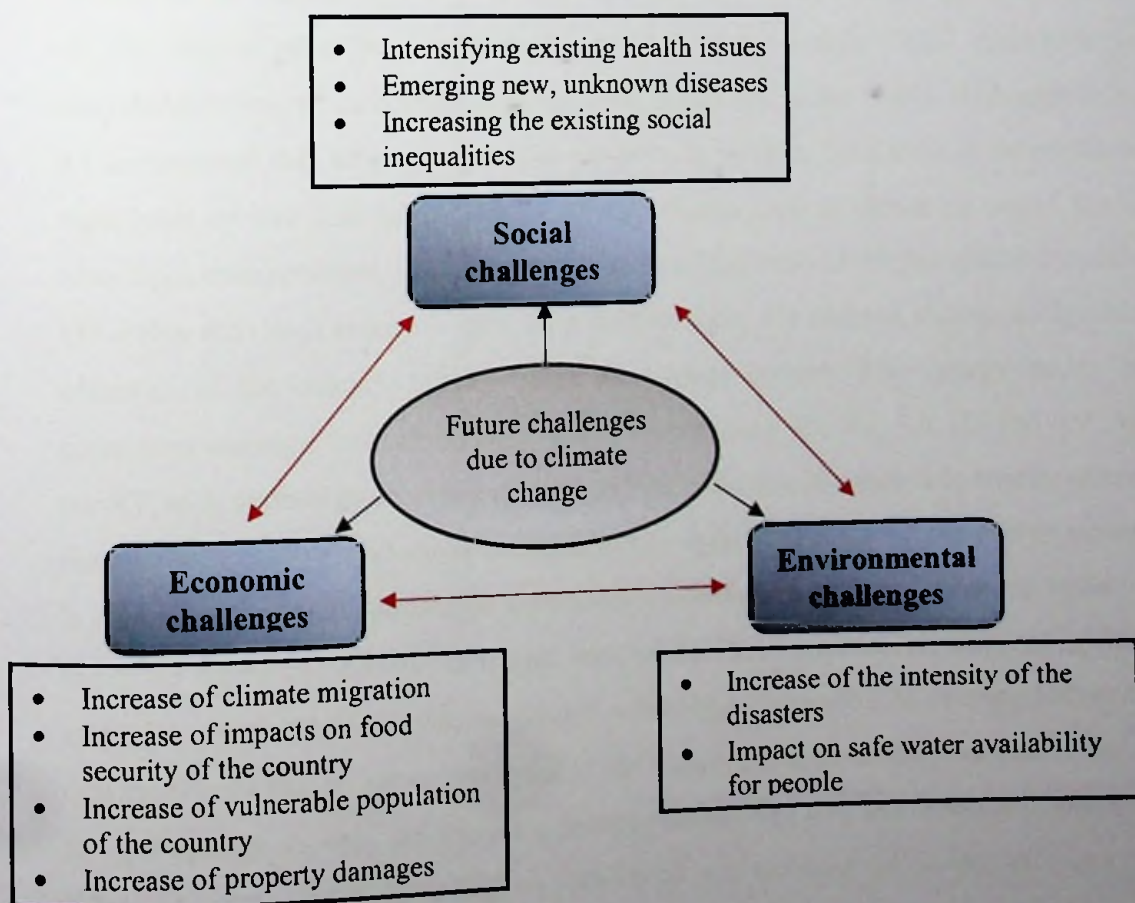


Figure 4.9: Future climate change challenges

On this premise, appropriate actions need to be followed in order to overcome the prevailing as well as expected climate change challenges with the intention of achieving a climate-resilient future. Accordingly, the next section focuses on the ways of overcoming the climate change challenges effectively and efficiently within the context of Sri Lanka.

#### **4.3.3 Overcoming the climate change challenges in Sri Lanka**

From the opinions of the respondents, climate change mitigation and adaptation were differently viewed as the ways of overcoming the prevailing and expected climate change challenges. The below two sub-sections unveils the climate change mitigation and adaptation in the view of the respondents.

##### **4.3.3.1 Climate change mitigation**

Climate change mitigation mainly focuses on reducing GHG emissions to the atmosphere through different human interventions. However, as highlighted by almost all the respondents, the contribution of Sri Lanka towards GHG emissions is considerably low when compared to the other countries in the world. Although it is, R1 commented that when compared to the past, at present, Sri Lanka is becoming a significant emitter than before due to several reasons such as increased use of fossil fuels, high transportation, land degradation and shifting most of the population towards life styles with high emission rates. In a such context, the climate change mitigation potential of the country mainly relies on several sectors. The energy sector is prominent amongst them as noted by many respondents R1, R2, R6, R7 and R9. As per R7, still, the energy production is not shifted to the use of renewable energy where the country's energy production mostly depends on coal. In doing so, the energy sector is contributing to GHG emissions significantly although the country is having ways to move for renewable energy, as further insisted by R2 as well as R6. Supporting this view, R1 noted that *"Sri Lanka has excess wind power potential. More than 5000MW of wind energy can be easily developed in our country. The same situation can be seen for hydropower as well. So, we are a pioneer nation that can use renewable energy. But the country is still depending on fossil fuels and emitting all the contributors to*

*climate change rather than past*". The transportation sector has become another leading sector that contributes to GHG emissions, as highlighted by R7. R7 mentioned that the number of vehicles used today is exceedingly high where a significant amount of them are outdated vehicles which emit more GHG. Similarly, the industries are considerably high within the country with the increased urbanisation where the emissions from these industries are also high, as highlighted by R11. The land-use patterns of the people also play a foremost role in GHG emissions where land degradation is significantly happening today, as mentioned by R2. *"Our land-use patterns are very ad-hoc and we are doing a lot of land clearings for development and other purposes. If we reinstall original land-use patterns and reduce land degradation, we can definitely reduce the emissions"*, as per R2. Another area to be focused on in this direction is waste disposal, as per R7 and R9. R7 commented that improper waste disposal, which can be identified as a significant issue today, especially in most of the urban areas of the country, highly contributes to GHG emissions. Presently, following proper waste management plans are notably lacking in Sri Lanka although such plans can be effectively practiced in any sector or area without any obstacles, as stressed by R9.

By considering the above factors, it can be seen that different sectors have different potentials to reduce GHG emissions in a significant manner through implementing different mitigation measures. As commented by R5, although Sri Lanka is not a significant contributor to GHG emissions, a crucial necessity can be identified to perform different mitigation measures because the country is experiencing climate change challenges exceedingly. Thus, in brief, climate change mitigation is tremendously important for Sri Lanka today. In fact, R4 asserted that as a country Sri Lanka has agreed to contribute to climate change mitigation through different policies and plans. Paris Agreement can be regarded as the best example for that, where Sri Lanka has agreed to maintain the CO<sub>2</sub> emission at a certain level. Hence, the country has the responsibility to engage in GHG reduction practices with the intention of contributing to climate change mitigation. However, R9 pointed out that *"...it is somewhat difficult to implement these climate change mitigation measures in an advanced manner because they need high investments"*. R5 agreed with this view and

added that “...implementing different mitigation measures need heavy investments and the prevailing problem is; does a country like Sri Lanka can afford such amount of expenses for them. Sri Lanka has a very less capacity to invest in different actions towards climate change mitigation”. Indeed, it can be identified as a matter of strength of the financial status of the country. Although the country is in the position of implementing different mitigation measures up to a certain extent as individuals, families, sectors and so on, it is hard to go for more advanced levels of such implementations due to the financial issues within the country.

#### **4.3.3.2 Climate change adaptation**

Climate change adaptation basically refers to making adjustments by people, society and ecological systems to deal with the climate change challenges. More succinctly, it is about “living with climate change and possible disasters”, as mentioned by the majority of the respondents. Under the climate change adaptation, mainly the adaptive capacity of people, ecosystems and the whole country need to be further improved in order to reduce their vulnerabilities towards climate-resilient future, as commented by R10. According to R2, R4 and R7, since the country is already suffering from severe changes in climate and will continue in the future, adaptation has become an equally important option which not to be missed. R4 believed that “...climate change adaptation can be done in different perspectives like knowledge enhancing, resource allocation, capacity increasing etc. in different areas like our production systems, agriculture systems, consumption patterns, water conservation and even in socio-economic processes”. Agreeing with this view, R10 highlighted that, different technologies, and methods need to be adopted by relevant parties in different spatial scales in order to make things climate-resilient. R10 also viewed that at present, different adaptation measures have been enacted within the country towards climate change. For instance, R2 mentioned that “...the farmers are moving towards mixed agricultural crops rather than using mono-crops knowing that there are many impacts due to climate change. In past, they cultivated rice to get the yield within 3 or 6 months, but today they cultivate ultrashort crops to get the yield within 2.5 months because they know the possible risk of climate change”. However, R7 was in the view that it is

questionable whether these adaptation measures are implemented effectively to get the best outcome from them where more scope can be seen to further increase them. Hence, knowledge, awareness and understanding need to be created more and more among the relevant parties especially the communities to make them move forward towards climate change adaptation, as noted by R1. R1 opined that “...adaptation mainly depend on knowledge. Actually, people become themselves at risk because they don't know the things properly. So, their adaptability has gone down. So, we need all people to involve in this process by enhancing their adaptive capacity”. As strongly suggested by almost all the respondents, adaptation is the best solution Sri Lanka has as a developing country to cope with climate change challenges since the country is somewhat struggling to implement mitigation actions effectively due to many obstacles including lack of finance. When it comes to the adaptation, it does not require higher investments most of the time where anyone can involve in the process at any level.

By considering the above facts, it is evident through the respondents' views that the country is currently practicing different measures under both climate change mitigation and adaptation, however, needs to be further improved in performance. Also, the country has been given more focus towards climate change adaptation over mitigation due to the prevailing limitations. It is, therefore, being a developing nation, Sri Lanka is more suited for implementing climate change adaptation measures than implementing mitigation measures most of the time. Based on the discussion, the summary of the findings is presented in Figure 4.10.

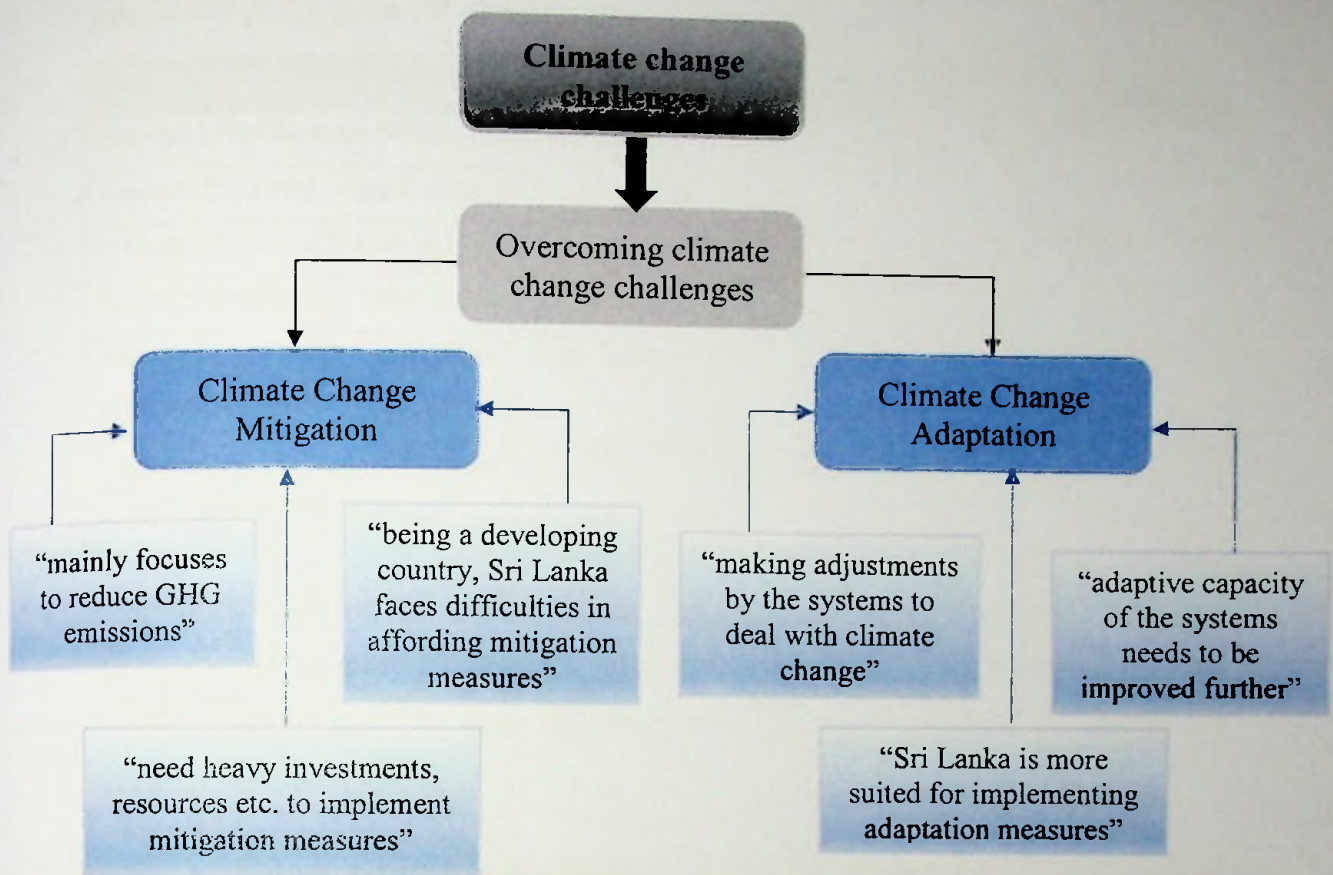


Figure 4.10: Climate change mitigation and adaptation to overcome the climate change challenges

#### 4.3.4 Climate change policies and plans available in Sri Lanka

To date, a wide variety of policies, action plans and strategies have been formulated by government authorities and many other institutions in order to implement different climate change mitigation and adaptation measures within the country. By reviewing the prevailing literature, 10 different policies, plans and strategies were identified in an extensive manner (refer Section 3.6.1) where those identified policies, plans and strategies were further endorsed by the in-depth interviews as well. Apart from them, many other policies and plans with regard to climate change mitigation and adaptation were added by the respondents during the interviews where the summary of the findings can be presented as shown in Table 4.4.

Table 4.4: Policies, plans and strategies added by respondents

| Policy/ Plan or Strategy                                                              | Respondent |
|---------------------------------------------------------------------------------------|------------|
| National Biodiversity Strategy and Action Plan                                        | R1, R9     |
| Sustainable Financing Strategy by Central Bank                                        | R1         |
| National Physical Planning Policy                                                     | R4, R6     |
| Country Partnership Framework                                                         | R8         |
| Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation | R1, R2     |
| Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation | R1, R2     |

According to Table 4.4, six (06) policies, plans and strategies which focus on climate change considerations were added by several respondents. A comprehensive analysis of the focuses of these policies, plans and strategies were presented in Section 4.2 through a document review.

#### 4.3.5 Barriers to formulate and implement climate change policies and plans in Sri Lanka

When formulating and implementing different policies and plans towards climate change mitigation and adaptation, a number of barriers can be identified hindering the whole process. Those barriers can be categorised under six (06) main categories as economic, institutional, informational, technological, social and other barriers, as identified in Section 3.7.1. Specifying to the Sri Lankan context, the barriers in climate change policy formulations and implementations together with their root causes which indicate the actual issues that provide the basis for the particular barrier were identified in an exhaustive manner, as discussed in the below sub-sections. When presenting the findings, the details captured from the semi-structured interviews are supported with the NVivo coding structure and cognitive maps.

##### 4.3.5.1 Economic barriers

This sub-section focuses on economic barriers of climate change policy formulation and implementation activities, as per the views of the respondents. The coding

structure for the identified economic barriers is portrayed in Figure 4.11. Further, the cognitive map for economic barriers is shown in Figure 4.12. The findings were discussed as per both coding structure and cognitive map.

| ⊕ Name                                                                  | ▲ Files | References |
|-------------------------------------------------------------------------|---------|------------|
| ⊖ ○ Barriers in climate change policy implementations in Sri Lanka      | 13      | 105        |
| ⊖ ○ Economic barriers                                                   | 10      | 11         |
| ○ Inadequate funding for climate actions                                | 9       | 9          |
| ○ Inefficient distribution of funds for climate actions among the relev | 2       | 2          |
| ⊖ ○ Informational barriers                                              | 9       | 14         |
| ⊖ ○ Institutional barriers                                              | 10      | 30         |
| ⊖ ○ Other barriers                                                      | 11      | 17         |
| ⊖ ○ Social barriers                                                     | 10      | 21         |
| ⊖ ○ Technological barriers                                              | 8       | 12         |

Figure 4.11: Coding structure for economic barriers in climate change policy formulations and implementations

According to Figure 4.11, two (02) main economic barriers which hinder the policy formulation and implementations towards climate change adaptation and mitigation were identified by the respondents. The majority of the respondents, which is ten out of 13, pointed out “**inadequate funding for climate actions**” as the most common economic barrier in this direction. R2 asserted that the targets of these policies and plans are really ambitious and implementing required actions to achieve those targets needs higher investments (E1, E2). In fact, this situation can mostly be applicable when it comes to climate change mitigation than adaptation because when implementing climate change mitigation measures, different advanced technologies are highly needed over adaptation measures, as noted by R1 and R9. The financial strength of the country is highly paramount in attaining such requirements (E3, E4). R7 supported this view with an example as “...a suggestion was made to upgrade the existing Liquefied Natural Gas (LNG) power plant to get more amount of Mega Watts (300 MW to 600 MW). But the engineers were in the view that although LNG is very much beneficial economically, it is really difficult to handle such an implementation because it requires heavy investments for pipelines, tunnels and other required technologies. Actually, heavy infrastructure investment is needed for such implementation. They mentioned

*that the finance required for such implementation can be invested to establish another coal power plant*". Hence, it is obvious that many technologies are needed for such implementations and thereby high investments are also in need. Actually, R8 was in the view that financial issues can be the major reason for the unavailability of more advanced technologies in this regard (E5) (refer Section 4.3.5.4). Hence, as further stated by R8, although a number of actions have been proposed under different policies and plans, Sri Lanka is considerably struggling to go for more advanced levels in most of the climate actions, especially related to mitigation due to the existing financial issues (E6). Therefore, "inadequate funding for required technologies" can be identified as one of the root causes available under the main barrier. At the same time, conducting more research studies into climate change also stand in need of strong financial support since they demand multi-disciplinary activities from different subject areas to make the ultimate targets more fertile, as stressed by R7 (E7). However, R5 commented that "...currently, the required resources for these research activities like laboratories, research institutions are somewhat lacking due to the less amount of finance allocated" (E8). R5 further added that such situations may lead to a lack of morale among young researchers in getting involved in research on climate change restricting novel and innovative ideas into the implementations of different climate actions (E9). Thus, "inadequate funding for research activities" also can be regarded as another root cause under the barrier of "inadequate funding for climate actions". As per the view of R6, another concern was about whether an adequate amount of finance is allocated for different ministries, departments or sectors by the government. For example, R6 insisted that "...there is a budget line allocated for Ministry of Environment. But it is questionable whether the available budget is adequate to implement all the required climate actions" (E10). Accordingly, the required funding needs to be allocated for the relevant ministries, departments or sectors in an effective manner in order to carry out the relevant climate action implementations. At present, it is not happening at an expected level. Thus, "not allocating a dedicated budget line for relevant parties" can be identified as another root cause under the said main barrier. In fact, this situation may be further deepened due to the barrier "lack of a coherent vision by the government", which was captured as an institutional barrier in Section 4.3.5.2. When the government undermines the climate change considerations within

the development plans, they may not tend to allocate an adequate budget for them (E11). Accordingly, this statement (E11) has a significant influence towards the barrier of 'lack of a coherent vision of the government'. Overall, since the country is significantly suffering from inadequate funds as insisted by all the respective respondents, accomplishing the developed targets in the climate change policies and plans has become a quiet challenge today. Accordingly, it is obvious that inadequate funding for climate actions has created a significant barrier in formulating and implementing these climate change policies and plans.

**"Inefficient distribution of funds for climate actions among the relevant parties"** was captured by R4 and R10 as another main economic barrier to implement different climate actions. R4 asserted that *"...the relevant ministries and other organisations have adequate funding from multilateral donors, international funds, allocated money by the government etc. for particular implementations, but the distribution of these available funding among the required parties is somewhat inefficient"* (E12). Especially, when it comes to the operational level where the proposed climate actions under the policies and plans are implemented, these available budgets can be inefficiently distributed among the relevant parties (E13). Sometimes, as a result, delays may happen when acquiring the funding from the relevant organisations, making the whole implementation activities delayed, as remarked by R10 (E14). Moreover, as further mentioned by R10, sometimes, the allocated budget for administration activities, publicity activities and other indirect activities is higher than the allocated budget amount for direct purposes such as for technological improvements, affected parties, contributing parties to the process etc. (E15). Thus, it can be seen that certain inefficiency can be identified in distributing the allocated budget for relevant parties as well as relevant purposes. It also directs to many inefficiencies in formulating and implementing climate change policies and plans in a whole, especially in implementation activities.

On this premise, the barriers which economically affect the climate change policy formulation, as well as implementation activities, can be identified distinctly with their root causes (see Figure 4.12).

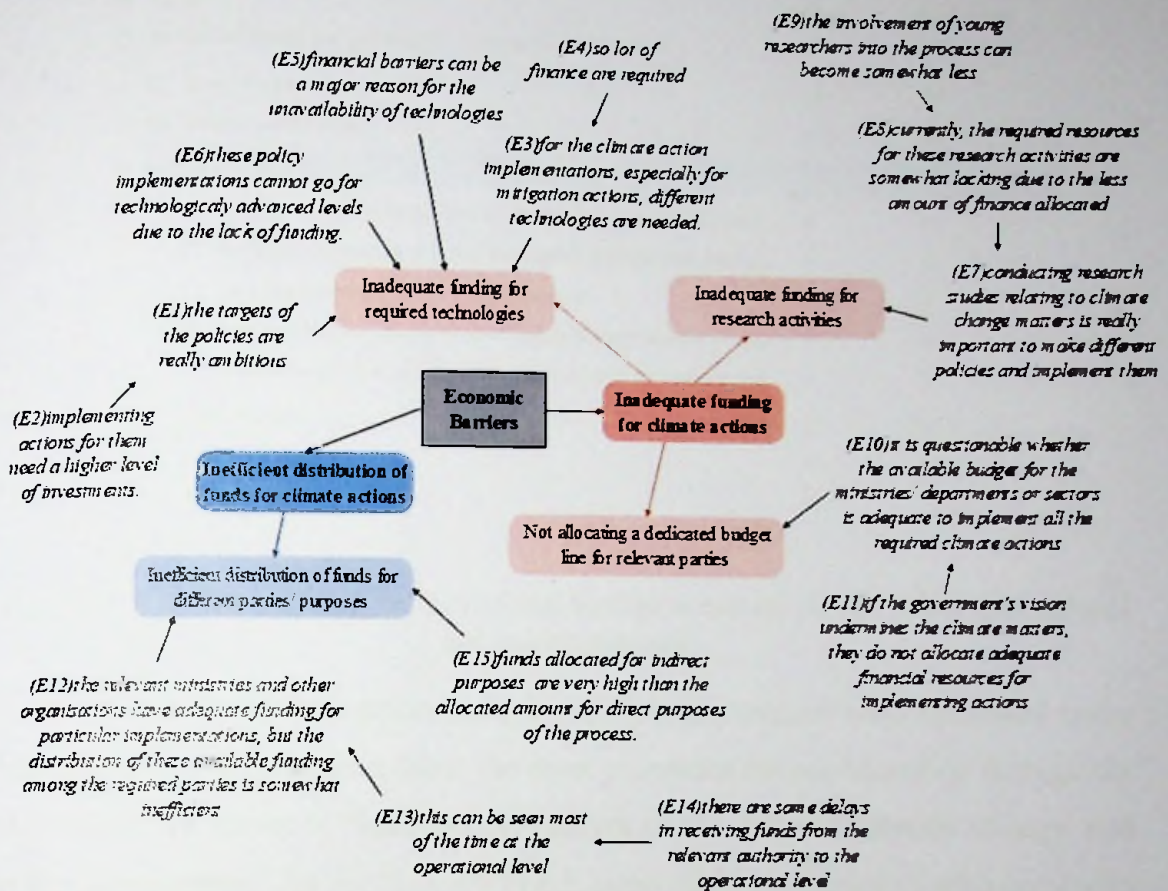


Figure 4.12: Economic barriers in climate change policy formulations and implementations

#### 4.3.5.2 Institutional barriers

This sub-section aims to give an understanding of institutional barriers that impede the climate change policy formulation and implementation activities in Sri Lanka. The findings were discussed as per the coding structure for the identified institutional barriers presented in Figure 4.13 and the cognitive map presented in Figure 4.14.

| ⊙ Name                                                               | ^ Files | References |
|----------------------------------------------------------------------|---------|------------|
| ⊖ ○ Barriers in climate change policy implementations in Sri Lanka   | 13      | 105        |
| ⊖ ○ Economic barriers                                                | 10      | 11         |
| ⊖ ○ Informational barriers                                           | 9       | 14         |
| ⊖ ○ Institutional barriers                                           | 10      | 30         |
| ○ Inadequate experts in the field of climate change and policy pers  | 8       | 11         |
| ○ Inefficient monitoring of policy formulation and implementation a  | 4       | 5          |
| ○ Lack of a coherent vision of the government                        | 2       | 3          |
| ○ Less coordination among the involved parties into policy formulat  | 7       | 8          |
| ○ Less involvement of private sector into the policy formulation and | 3       | 3          |
| ⊖ ○ Other barriers                                                   | 11      | 17         |
| ⊖ ○ Social barriers                                                  | 10      | 21         |
| ⊖ ○ Technological barriers                                           | 8       | 12         |

Figure 4.13: Coding structure for institutional barriers in climate change policy formulations and implementations

As per the views of the respondents, five (05) main barriers were identified under institutional barriers. Among them, the most prominent barrier identified through the majority of the views is **“inadequate experts in the field of climate change and policy perspective”**. As per the view of R5, some of the professionals who involve in climate change policy making and implementing activities are not having an adequate understanding of the subject area (I1). For instance, R5 opined that *“...sometimes people who are engaging in disaster management activities might not have a clear idea about disaster management act, relevant policies or other related areas”* (I1). R8 also was on par with this view and further added that some professionals in different ministries, departments or institutions may not have a clearer insight with regard to the particular subject matter because they may not have appointed for the most suited subject matter, they have familiar with. In consequence, they may reluctant to carry out their tasks properly and thereby their performance will be unconsciously reduced (I2, I3). Supporting this, R9 also added that *“...when people are not appointed for the right positions, they may reluctant to perform their tasks successfully due to less knowledge and understanding they have in that particular area because they may expertise for any other subject matter than the area they are assigned”* (I2, I3). Accordingly, “less understanding of the professionals on the subject area they are assigned” can be identified as a major issue which leads to the main barrier of “inadequate experts in the field”. This situation may further encourage the less

coordination among the parties, which was identified as another institutional barrier. Another aspect that needs to be focused under this barrier is “moving the experts to other countries”, as strongly viewed by R9. As per R9, when the experts are unable to transform their knowledge and experience into practice successfully in Sri Lanka with the collaboration of other parties, they may tend to move to other countries and get their ideas implemented in those countries. It is mainly due to the recognition and opportunities given for their knowledge and experience by those countries than Sri Lanka (I4, I5). This situation may be further exacerbated due to the lack of a coherent vision of the government, which is identified as another institutional barrier where climate change considerations are not energised adequately by the government. Particularly, some experts may have to face many difficulties in matching their knowledge and experience into the Sri Lankan context. It is mainly because the climate action implementation activities are struggling to go for more advanced levels due to the unavailability of novel technologies and adequate finance, therefore, the experts may not get many opportunities to apply their knowledge and experience in an innovative manner, as commented by R7 (I6, I7, I8). Indeed, these statements have a more significant influence on the economic barrier; ‘inadequate funding for climate actions’ (refer Section 4.3.5.1) as well as the technological barrier; ‘problems in availability of technologies (refer Section 4.3.5.4). As a result, to date, most of the experts have been tended to move to other countries and it can be regarded as another root cause under the said main barrier. Furthermore, another root cause under the main barrier was captured by R5 as “poor perspectives of the professionals” with regard to climate-related matters. As highlighted by R5, sometimes a poor mindset can emerge within the professionals based on their assigned tasks. For example, there may be professionals who are in the perspective of “I’m interested in this particular area. But my task as a government officer or a designated officer is different” (I9). Such thinking patterns may discourage the professionals to do their best within the given scope since they may expertise in another field. This situation also can lead to inadequate experts in the field considerably. At the same time, this root cause can be a reason for not following an integrated mechanism by the parties since the poor mindset of people regarding their job roles can weaken the interrelationships among them.

The next critical barrier captured by the respondents under this category is “**lack of coordination among the involved parties into the policy formulation and implementation activities**”. As commented by R4 and R13, different parties with differentiated focuses have been involved in formulating and executing different types of policies and plans towards climate change mitigation and adaptation within the country (I10). For example, different state agencies and ministries who provide a leadership role for the policy implementations, researchers who provide novel and innovative ideas in this regard, UN agencies, community-based societies, NGOs who involve in the consultation activities relating to these policy formulations and implementations etc. can be identified as some examples for the involved parties in these processes, as mentioned by the respondents. In doing so, the coordination among them needs to be at the pinnacle in order to gain the best outcome through these policy actions. However, when it comes to the current situation, a major shortcoming can be identified where the coordination among the involved parties is really lacking, as highlighted by the majority of the respondents. As claimed by R2, “*The involved parties are not following integrated mechanisms in formulating and implementing these policies*” (I11). For example, when we consider the Agriculture Department and Irrigation Department, proper integration needs to be maintained by them when taking decisions on climate actions since the work done by said two departments are interconnected most of the time, as per R9. Agreeing with that R1 mentioned that a very limited number of people who could integrate the climate change considerations into the development processes can be identified in Sri Lanka (I12). For example, when developing policies and plans for the improvement of the agriculture sector, the climate change aspects need to be broadly visited since the link between the agriculture sector and climate change is continuously widening. To do that, the inputs from many other ministries or departments like the Irrigation Department, Ministry of Environment etc. are really important where proper coordination is highly acknowledged in a such situation. Even so, such an effective integration between the two parties is notably lacking mostly leading to many more inefficiencies in their performance, as per R9. Correspondingly, the same situation can be observed in most of the departments, sectors, or institutions today and thereby the policy formulation, as well as implementation activities, have been significantly interrupted, as noted by

R4 and R11. Accordingly, “not following an integrated mechanism by the parties” can be identified as one of the root causes under the said main barrier “lack of coordination among the parties”. Particularly, this situation can be further deepened due to the inadequate experts in the field which was identified as the most critical institutional barrier in this section. When there is an absence of adequate experts, the coordination among the departments, ministries or any other involved party can be weakened largely. Added to this, R7 asserted that ego with the power of the relevant parties can be seen in many agencies, departments and organisations (I13). As an example, R7 disclosed that “...when implementing any proposed action, some organisations who involved in that process are trying to work with their own schedules and strategies with their power rather than complying to other relevant parties’ views and opinions. So, the people who propose the particular implementation may unable to implement it in an expected manner” (I13). In such situations as well, the coordination among the involved parties seems to be weakened. As a result, the ultimate targets of the proposed actions through the policies and plans may not achieve effectively and efficiently. Hence, “unnecessary ego with the power of the relevant parties” can be regarded as another root cause under the main barrier. Accordingly, the respondents revealed that this less coordination among the parties has created a significant barrier with regard to these policy formulations and implementations within the country.

**“Inefficient monitoring of policy formulation and implementation activities”** was captured as another critical barrier based on the opinions of the respondents. According to R8, “...even though different policies and plans are implementing largely within the country, nobody is monitoring their progress appropriately” (I14). Supporting this, R1 mentioned that as a country, Sri Lanka is having a very limited number of mechanisms to do effective monitoring of the implemented climate actions (I15). For example, if the CO<sub>2</sub> emissions from a particular sector or process are not evaluated and monitored from time to time, it is really hard to implement proper mitigation actions to reduce the emissions, as further stated by R13. Not only for the policy implementation activities, it is highly paramount to do effective progress monitoring for climate change policy making activities as well, as pointed out by R9. According to R9, “...when there is no proper monitoring and evaluating methods to follow, the continuity of the policy

*making activities can be heavily impacted. There are some policies like water-related policies, they are always initiating but no continuity*" (I16, I17). Hence, adequate procedures for effective progress monitoring need to be followed by all the relevant parties to get to know whether the expected outcome can be gained from the particular action. Accordingly, "a limited number of mechanisms to do effective monitoring" can be identified as the main root cause which directs to the main barrier of "inefficient monitoring processes". More importantly, sometimes the less availability of different technologies (refer Section 4.3.5.4) can affect less effective monitoring processes in some situations. For example, if the relevant parties need to gain emission-related data from time to time to monitor a particular implementation for CO<sub>2</sub> emission reduction, required technologies may not adequately available. Indeed, financial issues also can make a significant impact in this regard. At the same time, although different monitoring procedures and mechanisms have been planned by the relevant parties to monitor the progress of the climate actions, they may not implement in an efficient manner due to the inadequacy of Key Performance Indicators (KPIs), as highlighted by R2. R2 stressed that *"The established KPIs for progress monitoring of these actions are not effective and adequate based on the size and scale of their ultimate targets"* (I18). Since these climate change policies cover a broad area at once, the established targets are more complex, as per R1 (I19). For example, if there is a proposal for conducting awareness programs on climate change mitigation and adaptation, the way of conducting such programs may vary across different sectors and levels. Hence KPIs need to be established to measure the progress of each and every aspect of the proposed implementation by considering all the relevant factors such as the areas covered under each sector, a number of programs conducted at different levels etc., as further added by R1. It is, therefore, "having inefficient and inadequate KPIs for progress monitoring" can be considered as another root cause under the main barrier for the successful implementation of mitigation and adaptation measures within the country. In fact, this situation can be further deepened when the involved parties have less understanding of the subject matter, as previously identified as a root cause for inadequate experts in the field.



Based on the interview findings, another barrier was identified under this category as **“less involvement of private sector into the policy formulation and implementation activities”**. According to the respondents R2, R5 and R8, many private sector organisations have engaged in various emissions reduction activities where methods for renewable energy production, water management mechanisms, the development of different technologies can be identified as some examples (I20). However, there is more scope for this involvement to improve further, as viewed by R2. Agreeing with that, R5 asserted that *“...private sector is willing to give the support for the government to reduce the climate change issues with their resources and capabilities. But the recognition and chances given to them to involve in this process are somewhat less today”* (I21, I22). Hence, the government and other relevant parties should more identify the ways of incorporating the private sector organisations into the process by strengthening the public-private partnerships, as per R2 (I23). In this context, “less opportunities given for the private sector to be involved in the process” can be identified as a significant issue that leads to “less involvement of private sector”. Actually, this situation may contribute to the previously identified economic barrier “inadequate funding availability for the climate actions” (refer Section 4.3.5.1) as well because the private sector has a significant capacity to invest in the different implementations of climate change mitigation and adaptation measures, as pointed out by R2, R5 and R8.

Another barrier identified by R1 and R7 under this category is **“lack of a coherent vision of the government”**. R1 commented that *“The government’s vision does not accommodate or give high priority for climate change considerations”* (I24). By endorsing that view, R9 further added that *“Since the government’s development plans not includes the climate change considerations up to an expected level, the possible strategies for climate change mitigation and adaptation are not taken into consideration in an expected level”* (I25). For example, when there was a war within the country, the government’s priority was totally given for that while climate change considerations were neglected significantly, as per R4. The same situation can be observed when it comes to the current Covid-19 pandemic situation of the country as well. On this wise, the level of priority given for the climate change considerations by

the government may change due to many other focuses of the government from time to time. Hence, “less priority is given to the climate change considerations by the government” can be considered as another root cause for the said barrier. This situation may have a direct impact towards not allocating a dedicated budget line for the climate matters, which was identified under the economic barriers (refer Section 4.3.5.1).

In this context, the barriers from an institutional level that hamper the climate change policy formulation and implementation activities can be identified where the identified barriers and their root causes are presented in Figure 4.14.

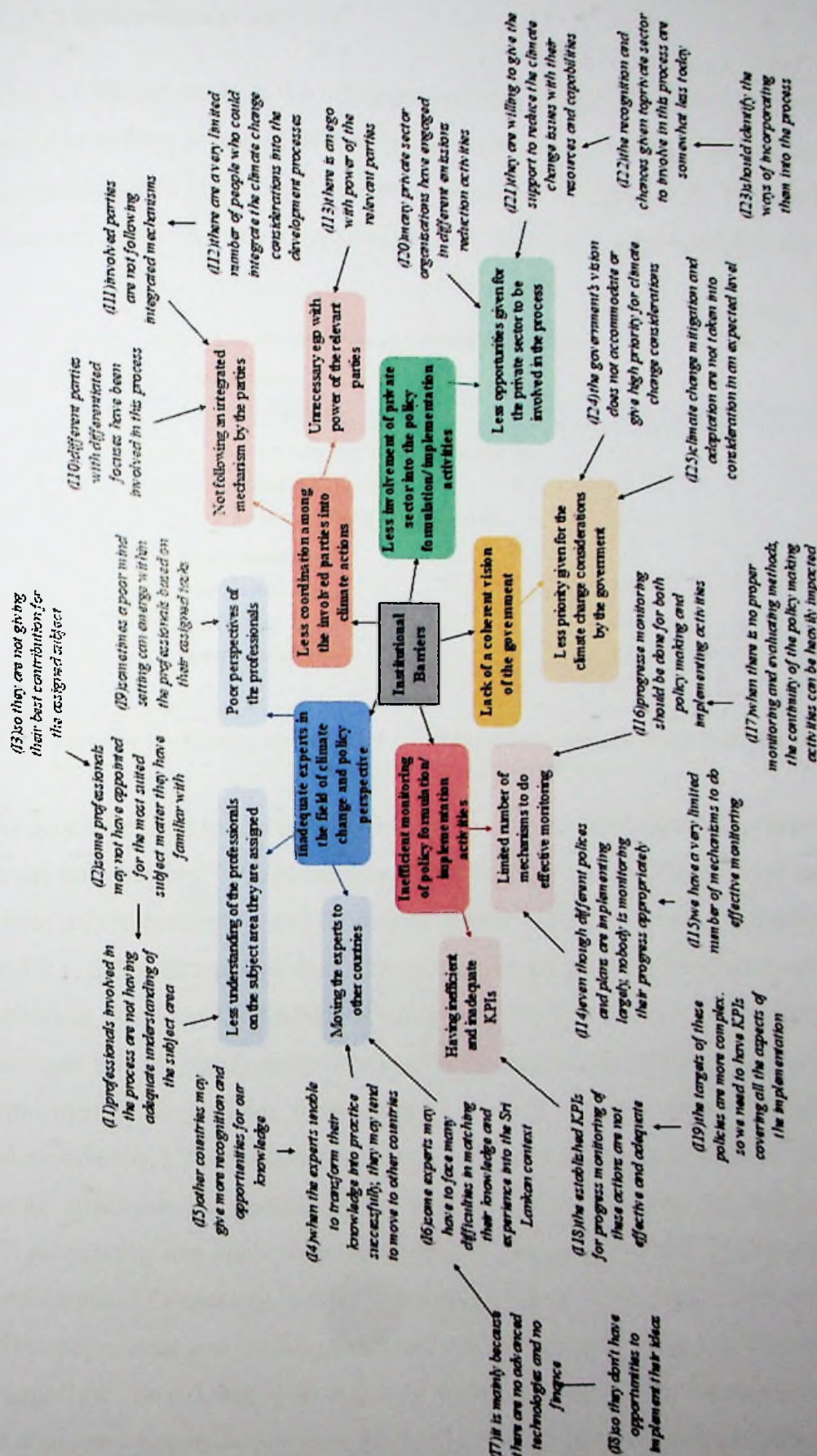


Figure 4.14: Institutional barriers in climate change policy formulations and implementations

4.3.5.3 Informational barriers

This sub-section presents the informational barriers that affect climate change policy implementations as identified through the in-depth interviews. The coding structure for the identified institutional barriers is presented in Figure 4.15. The findings were discussed based on that coding structure and cognitive map presented in Figure 4.16.

| ⊕ Name                                                             | ^ Files | References |
|--------------------------------------------------------------------|---------|------------|
| ⊖ ○ Barriers in climate change policy implementations in Sri Lanka | 13      | 105        |
| ⊖ ○ Economic barriers                                              | 10      | 11         |
| ⊖ ○ Informational barriers                                         | 9       | 14         |
| ○ Difficulties in easy interpretation of required data             | 3       | 3          |
| ○ Poor data sharing processes                                      | 4       | 4          |
| ○ Problems in accessibility for required data                      | 6       | 7          |
| ⊖ ○ Institutional barriers                                         | 10      | 30         |
| ⊖ ○ Other barriers                                                 | 11      | 17         |
| ⊖ ○ Social barriers                                                | 10      | 21         |
| ⊖ ○ Technological barriers                                         | 8       | 12         |

Figure 4.15: Coding structure for informational barriers in climate change policy formulations and implementations

As per the findings from the in-depth interviews, three (03) key barriers were identified under this category. “**Problems in accessibility for required data**” was captured by seven (07) respondents out of 13 as most common amongst others. As disclosed by R1 and R4, different types of data such as climate-related data, emissions-related data, historical data about the disasters that occurred within the country, monetary values of damages etc. are highly paramount in establishing targets and proposing actions to be implemented to achieve those targets towards climate change mitigation and adaptation (In1). Anyhow, the inadequacy of some types of data can be identified in some situations, as opined by R6 and R13. For example, R6 mentioned that “...forecasting and early warning systems in Sri Lanka should be transformed into impact-based forecasting and early warning systems. That means if we get data like Western province will get this amount of rainfall, Central province will get this amount rainfall etc., they do not show the exact impact of the rainfall. What we need to know is data like whether the Southern highway will be get flooded, whether that particular

*area will get flooded due to this amount of rainfall etc. which present the exact impact that can happen*" (In2). In truth, such types of data are somewhat lacking today in some situations which can lead to inefficiency in climate decision-making processes. This inadequacy of data can be mainly due to the issues in currently available technologies in this regard, as further added by R6. If there is an absence of fully improved, advanced technologies, capturing more advanced-level data may become somewhat challenging. This was further discussed in Section 4.2.6.4 under the technological barriers. This view was further supported by R8 as well mentioning that sometimes unavailability of historical data on climate change impacts, causes and other related aspects are somewhat lacking due to the inadequacy of proper systematic ways to record them (In3, In4). Indeed, such types of historical data are highly paramount in policy making activities in order to establish the climate change mitigation and adaptation targets for future years. Hence, "inadequacy of some types of data" can be identified as one of the root causes for the said main barrier. At the same time, R9, R10 and R13 commented that some prevailing data are not freely available for each and every party who is contributing to climate change mitigation and adaptation activities (In5, In6). For example, R9 stressed that "...if we need any climate-related data from Meteorological Department for any climate action implementation, we have to pay a lot of money to get those data because they are not sharing the data with others easily" (In6). Further adding, R9 highlighted that when conducting research studies on climate change, a lot of data may require however, for research students, it is hard to access data from such organisations very easily (In7). In consequence, the effectiveness of the research contributions in this direction can be largely impacted. Hence it is true that these two situations may lead to inadequate funding for research activities which was identified under the economic barriers in Section 4.3.5.1. Accordingly, "less availability of free data" also can be considered as another root cause for issues in data accessibility. As another concern, R4 noted that some of the available data and information is widely spread and not in one platform (In8, In9). Further, adding, R4 mentioned that different databases from different organisations including government organisations, private sector organisations, NGOs etc. are available where the accessibility for such different databases may vary from one to another (In9). If all these data are in one platform, it is very much beneficial for

any party to access them easily. However, based on the current situation, it has become somewhat difficult since the data are widely spread. Added to this, R10 highlighted that “...different studies, reports, articles and many other documentations on climate-related matters are widely spread. If all of them are in one platform/ repository, it will be highly helpful for the involved parties in this process, especially for the researchers” (In10). Therefore, “unavailability of data in one platform” can be regarded as another root cause that leads to inefficiencies in data accessibility, which is the main barrier identified. This situation may be further amplified by less coordination among the involved parties, which was captured as an institutional barrier in Section 4.3.5.2. In addition, most of the available data are in different formats and those different formats make the accessibility and integration of those datasets hard to some extent for all the relevant parties, as ascertained by R1 (In11). Different technologies need to be used sometimes to convert the data from the existing formats to accessible formats where the technical know-how in this regard needs to be further improved, as further added by R1 (In12). Accordingly, the view by R1 has a more significant influence on the barrier of ‘problems in available technologies’. So that, problems in accessibility for required data may be further deepened due to the issues in available technologies as well as less technical skills of the relevant parties, as detailed in Section 4.3.5.4. Accordingly, “difficulties due to different formats of data” can also direct to many issues in data accessibility.

The next important barrier captured by the respondents in this category is “**poor data sharing processes**”. R2 added that “*It is very pathetic to see that even though the data is available, they are not effectively shared among the parties*” (In13). In fact, the “government does not encourage data sharing” among the parties and it can be regarded as one of the major issues in this regard. R1 commented that “...we have to work on many complex procedures like some agreements and contracts when making the available data sharable” (In14). Added to this, as disclosed by R6, the necessity of paying some money for the Meteorological department to get their data can also be identified as another example for this situation (In15). Supporting this view, R7 highlighted that “*We can get data easily from the databases developed by NGOs, private organisations like International Water Management Institute, World Bank etc.*

*than from the government agencies' databases"* (In16). Accordingly, less encouragement from the government for data sharing has been created a significant issue that leads to poor data sharing processes. In fact, this situation is mainly due to the lack of coherent vision of the government in this regard which was previously identified as an institutional barrier in Section 4.3.5.2. When the government does not give a high priority to climate change considerations, data sharing processes in this regard may also not be effectively energised by them. At the same time, these data are in different formats as identified by R1 where some of those formats may not support sharing. R1 stressed that *"...some available formats of data are difficult to share. We have to convert such types of data into sharable formats"* (In17, In18). So that, "difficulties due to different formats of data" can be captured as another root cause for poor data sharing processes as well.

Another barrier, which was captured by R4, R6 and R10 is **"difficulties in easy interpretation of required data"**. R4 pointed out that *"Some types of data are really difficult to interpret. For example, sometimes we cannot easily understand the data in some databases by different institutions based on their formats"* (In19). Being a person from a non-profit organisation who involve in different consultation processes during policy making, R4 further added that sometimes, the data in a particular database can be easily interpreted by the respective institution only where sometimes, some of the other outside parties are somewhat struggling to interpret the available data (In20). This situation may further exacerbate due to the issue of different formats of data, which was previously identified.

Accordingly, it is evident through the interview findings that different informational barriers also can be identified along with their root causes when formulating and implementing different climate change policies and plans. The findings are summarised in Figure 4.16.

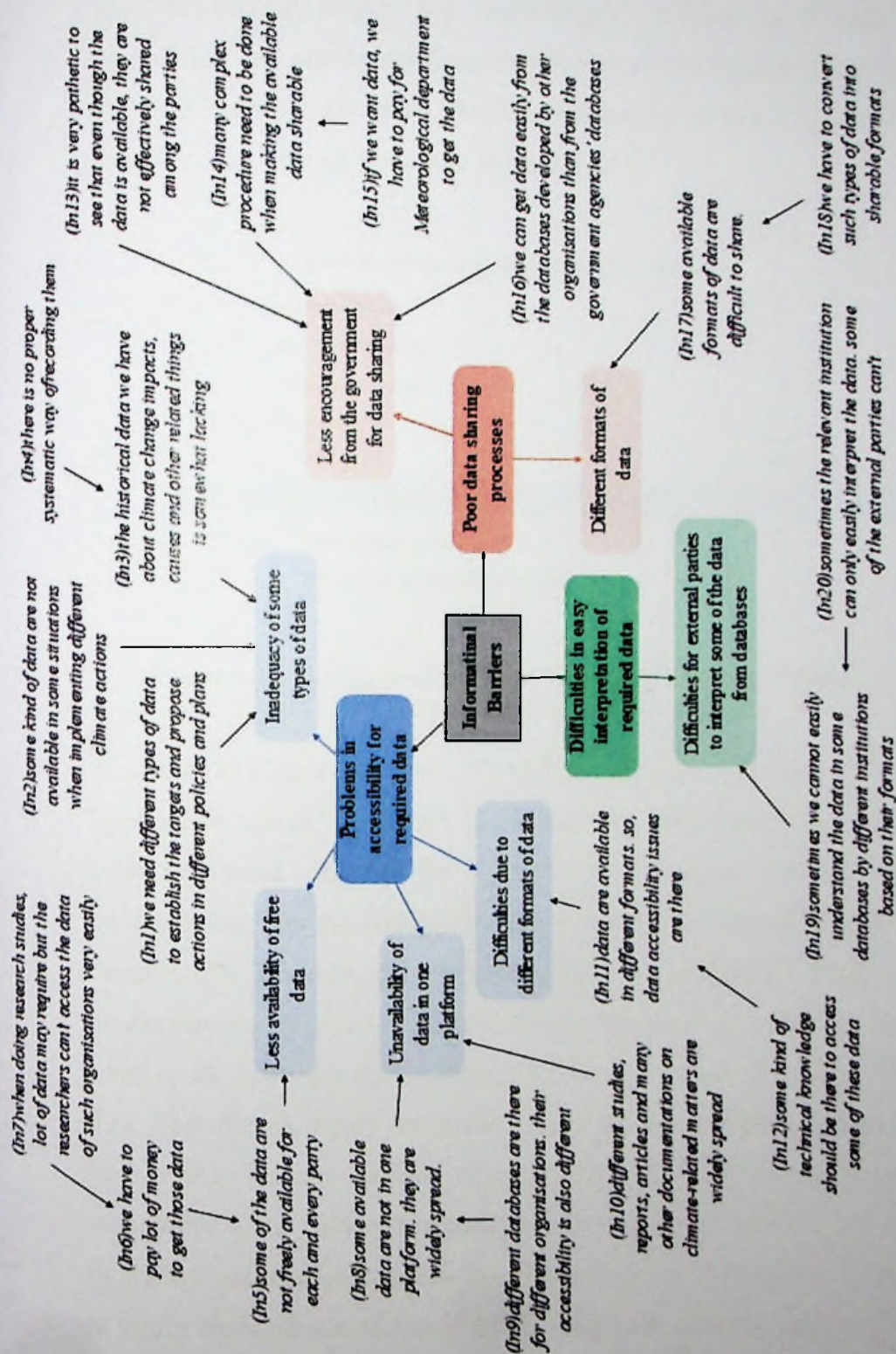


Figure 4.16: Informational barriers in climate change policy formulations and implementations

4.3.5.4 Technological barriers

This sub-section details the technological barriers to climate change policy formulation and implementation activities captured through the in-depth interviews. The findings were discussed based on the coding structure presented in Figure 4.17 and the cognitive map presented in Figure 4.18.

| ⊕ Name                                                             | ^ Files | References |
|--------------------------------------------------------------------|---------|------------|
| ⊖ ○ Barriers in climate change policy implementations in Sri Lanka | 13      | 105        |
| ⊖ ○ Economic barriers                                              | 10      | 11         |
| ⊖ ○ Informational barriers                                         | 9       | 14         |
| ⊖ ○ Institutional barriers                                         | 10      | 30         |
| ⊖ ○ Other barriers                                                 | 11      | 17         |
| ⊖ ○ Social barriers                                                | 10      | 21         |
| ⊖ ○ Technological barriers                                         | 8       | 12         |
| ○ Inadequate technical skills                                      | 5       | 5          |
| ○ Problems in availability of technologies                         | 5       | 7          |

Figure 4.17: Coding structure for technological barriers in climate change policy formulations and implementations

According to Figure 4.17, two (02) main technological barriers were identified by the respondents where “**problems in availability of technologies**” was captured as the most prominent. As per the opinion of R1, some available technologies for implementing climate change mitigation actions are not fully improved within the country. For instance, R1 mentioned that “... *waste to energy concept, biogas production etc. are currently following as the ways of reducing CO2 emission. But some of the available technologies for these processes are not fully improved*” (T1, T2). That means, many technical issues can be identified that need to be further improved to achieve the best outcome from them. Actually, this situation may be mainly due to the financial issues available within the country, as further emphasised by R1. R1 commented that “...*some of the having technologies need heavy investments to go for more advanced levels*” (T3). So that, despite the climate change challenges which are exceeding day by day, being a developing country, overcoming this situation has become a crucial challenge today. This was further detailed as an economic barrier in Section 4.2.6.1. Accordingly, “unavailability of fully improved technologies for

climate actions” can be identified as a root cause for the main barrier of “problems in availability of technologies”. Added to this, another concern was given by the respondents for the inadequacy of some technologies for climate action implementations. R5 viewed that “...as a developing country, we don’t have adequate technologies in some situations to implement some mitigation or adaptation actions” (T4). For example, R12 mentioned that “Sri Lanka has an excess wind power potential. More than 5000MW of wind energy can be easily developed in our country. Also, this wind energy can be converted into Hydrogen and many other fuels that can be used for transportation and energy production. But our technical capacity has not been well-improved yet to engage in such types of implementations” (T4). Adding to this, R5 as well as R11 highlighted that the available technologies in many research laboratories and institutions within the country may not sufficient for research activities in some situations (T5). Hence, it is evident that “inadequacy of some technologies” can also be seen as another root cause for the main barrier, “problems in availability of technologies”. This situation may also be further encouraged by the weakened financial status of the country. Also, R1 further added that “adequate attention is not given to the relevant policies and other documents regarding these technological aspects by the relevant parties” (T6). For example, the Technology Needs Assessment can be considered as one of the major focuses towards the technological aspects in relation to the implementation of climate change mitigation measures (T7). However, adequate attention is not given to such policies to get an understanding of the current technological capacity within the country and get further steps to improve it, as further added by R1 (T8). Therefore, the current technological capacity of the country is remaining as it is without any improvements. Accordingly, “not focusing on the available policies and plans in this regard” can be considered as another root cause for the main barrier which was specifically identified by R1.

The next important technological barrier identified by the respondents is “**inadequate technical skills of the involved parties**”. According to the respondents, different technologies need to be widely manipulated when implementing different actions towards climate change mitigation and adaptation (T8). In doing so, improving the technical knowledge and capacity is highly paramount. Even so, at present, some



issues can be identified when it comes to the technological knowledge of the people who are involved in these policy formulation and implementation activities (T9, T10). R12 commented that “...*different technologies are used for monitoring and evaluating processes, data management processes likewise. But most of the people who involve in such activities don't have the adequate technical knowledge to use new technologies in a proper manner*” (T9, T10). Agreeing with that, R6 further added that different types of data in different formats need to be accessed and shared where different technological aspects are highly required. Thus, proper technical know-how is highly paramount for the people who are engaging in such activities. However, as further viewed by R6, currently, the technical knowledge they have is not well-improved which leads to many inefficiencies in data sharing and accessibility as well (refer Section 4.3.5.3).

On this premise, the interview findings revealed different technological barriers and their root causes from different perspectives which can make a major hindrance in climate change policy making and implementing activities. The findings can be presented distinctly as shown in Figure 4.18.

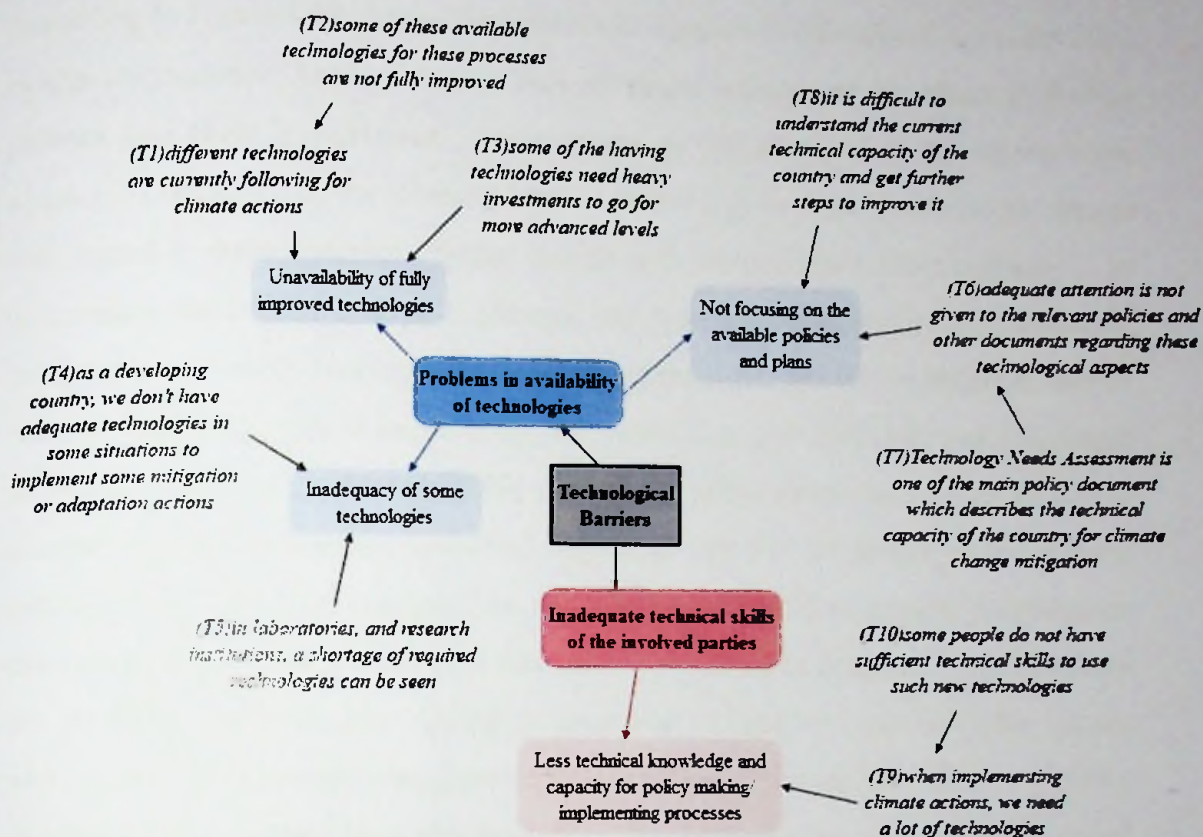


Figure 4.18: Technological barriers in climate change policy formulations and implementations

#### 4.3.5.5 Social barriers

The social barriers to the climate change policy implementations are discussed in this sub-section where the coding structure from the NVivo software is presented in the below Figure 4.19 while the cognitive map is presented in Figure 4.20.

| ⊙ Name                                                               | ▲ Files | References |
|----------------------------------------------------------------------|---------|------------|
| ⊙ Barriers in climate change policy implementations in Sri Lanka     | 13      | 105        |
| ⊙ Economic barriers                                                  | 10      | 11         |
| ⊙ Informational barriers                                             | 9       | 14         |
| ⊙ Institutional barriers                                             | 10      | 30         |
| ⊙ Other barriers                                                     | 11      | 17         |
| ⊙ Social barriers                                                    | 10      | 21         |
| ⊙ Lack of social awareness on climate change policies and their imp  | 10      | 13         |
| ⊙ Less involvement of local level communities in climate action impl | 4       | 4          |
| ⊙ Negative perspectives of the communities regarding policy imple    | 4       | 4          |
| ⊙ Technological barriers                                             | 8       | 12         |

Figure 4.19: Coding structure for social barriers in climate change policy formulations and implementations

According to Figure 4.19, three (03) main social barriers in this regard were identified by the respondents. Among them, **“lack of social awareness on climate change policies and their importance”** was captured by the majority of the respondents, which is 11 out of 13, as the foremost barrier. According to them, the social awareness with regard to these different climate change policies and plans, their importance in overcoming the climate change challenges and how the communities can involve in this process is notably lacking where significant potential can be identified to further enhance it (S1, S2). More importantly, R1 stated that although different awareness programs have been conducted in this regard, the effectiveness of such programs is considerably low most of the time (S3). Agreeing with this, R8 further added that the participation of the local communities for different types of awareness programs on climate-related matters is somewhat less today (S4, S5). For instance, *“...when there are workshops or awareness-raising programs in villages or cities, only the people who are interest in this area are participating for them. Other people who are working in other sectors or don't have any interest in this area may not participate for them”* (S5). In such context, although such programs target all the community members to disseminate the knowledge, most of the people may not get informed about the climate-related matters and thereby the effectiveness of the programs conducted can become somewhat low. According to R7, the effectiveness of such programs can be further lessened when the relevant authorities try to target the people who are at the managerial level than the people from local level communities through the same program (S6). Then the people from local level communities may not tend to actively participate in these programs. Hence, when conducting such awareness programs, the relevant authorities have the responsibility to conduct them in a way that is applicable for different levels, as further added by R7. Accordingly, the “less effectiveness of the awareness programs” can be regarded as a main root cause for the lack of social awareness. In fact, this can be further encouraged due to the lack of a coherent vision by the government because if the government does not tend to give significant priority to climate change matters, they do not focus on these awareness programs considerably. At the same time, the relevant policies, plans and other relevant documents that help to enhance the peoples’ understanding are not in the formats that the general public can easily understand, as commented by R6 (S7, S8). Supporting

this view, R7 noted that “...the scientific knowledge used by these policies, plans and other documents cannot be easily understood by the communities. The way of presenting the facts in those documents is more complex most of the time” (S8). Hence, most of the people are reluctant to refer them and get an understanding. Furthermore, a similar idea was brought forward by R11 mentioning that “...majority of these policies and other documents are available in the English language. But each and every document should be available in all languages like Sinhala, Tamil even. Then only all people can understand what facts are included in those policies and other documents” (S9, S10). Thus, “not publicising the existing climate change policies and plans properly” can be identified as another root cause that leads to a lack of social awareness.

Another two barriers were captured by the respondents with similar importance. One of them can be seen as “**less involvement of local level communities in climate action implementations**” for climate change mitigation and adaptation activities. Particularly, the local level communities are the most vulnerable party for the climate change, therefore, their involvement in these climate change mitigation and adaptation activities is undoubtedly important, as insisted by R10. Even so, it is not effectively happening today since the majority of the local level communities do not have a clear idea about how they can contribute to this process, as mentioned by R9, R10, R11 and R12 (S11, S12). As per R12, “...the people from community level don’t have a clear idea about what kind of implementations are there in these policies, what is the importance of them, how they can be implemented likewise” (S11). Hence, their involvement is significantly lacking. Actually, as highlighted by R9, “if they have a good understanding about how they can contribute to this process, they can do so many things even as individuals. For example, if they know about how to manage their waste, how to reduce the emissions, how to use renewable energy it is very good” (S12). Thus, it is apparent that the community involvement in this direction plays a pivotal role in achieving a climate-resilient future because without the involvement of real vulnerable parties for climate change, the policy implementers cannot ensure whether the climate action implementations are successful, as per R11 (S14). The less

involvement of local communities can be further strengthened by the lack of social awareness, which was identified as the previous barrier.

**“Negative perspectives of the communities regarding policy implementations”** was captured as the other barrier by several respondents. According to R3, some of the people from local level communities do not considerably care about the importance of these policies and plans as well as their effectiveness in overcoming climate change. As a result, they may not tend to engage in different climate action implementations in an active manner (S15, S16). For example, R10 mentioned that “...*although people are advised not to build houses in some areas because they are not recommended for developments due to the possibility of facing risks, people don’t care and build houses or buildings. That means they don’t think about the climate change impacts that they may face*” (S16). In truth, this can be identified as a certain type of attitudinal issue within some local-level community people, as further added by R10 (S17). Thus, “less concern of the people with regard to climate-related matters” has become a root cause for negative perspectives of the communities in this regard. Added to this, R7 emphasised that some people are in the view that climate change is a very deep topic to be aimed and highly knowledgeable professionals are in need to deal with it. However, the reality is climate change is a simple concept that can be understood by any level of people and communities can provide their fullest contribution to overcome the climate change challenges as individuals as well as groups. At present, this idea has not been effectively communicated to the local level communities (S18, S19, S20). Hence, the mindset of the local level communities is less sensitive for overcoming the climate change challenges which leads to many negative perspectives among them in this regard. This barrier also may further deepen due to the previously identified barrier, lack of social awareness because when the people are not properly aware of these policy implementations towards climate change mitigation and adaptation, they may not able to see the importance of them in a positive manner.

In this context, it is evident through the findings that many social barriers also can be seen when formulating and implementing different climate change policies and plans. The findings can be summarised as presented in Figure 4.20.



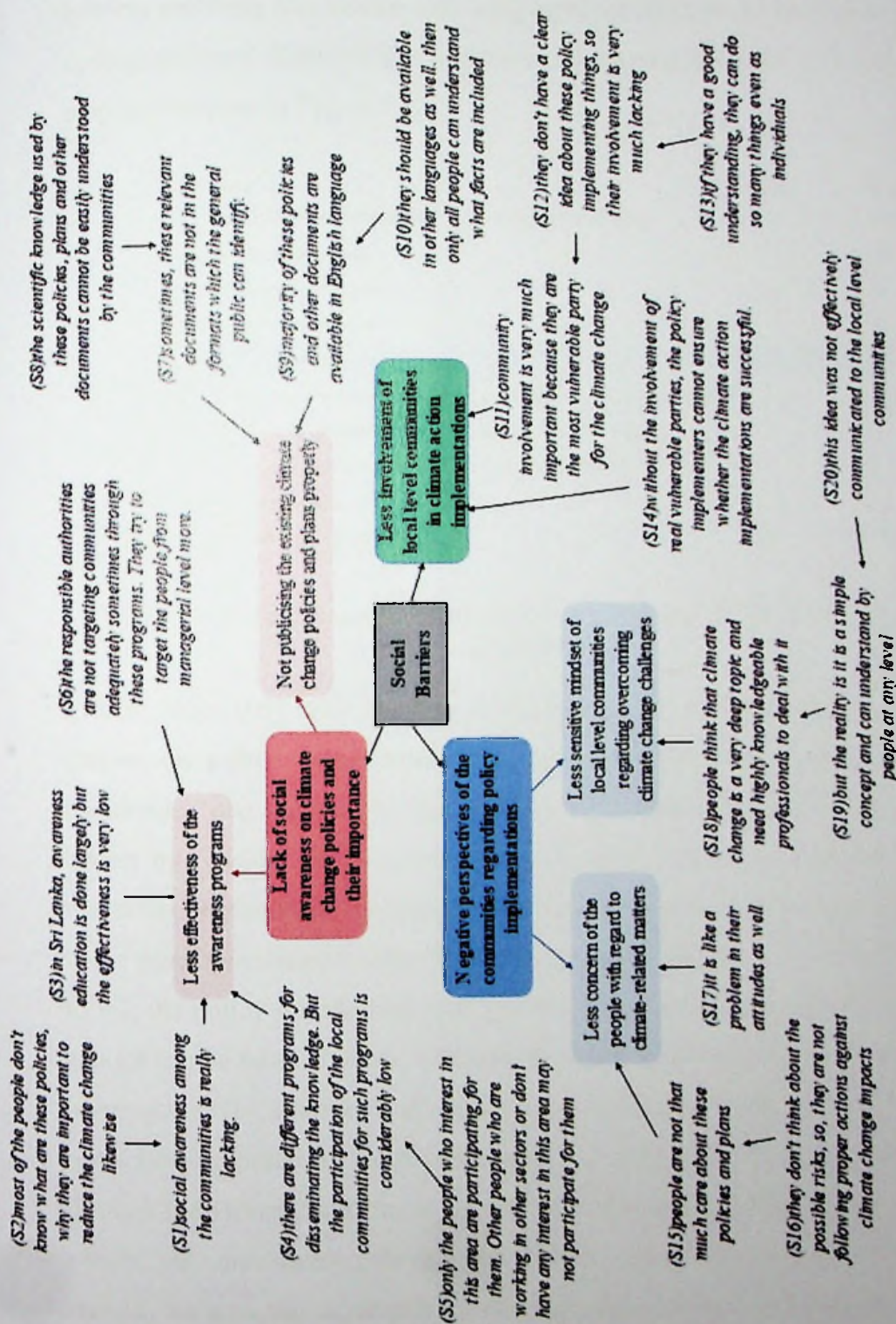


Figure 4.20: Social barriers in climate change policy formulations and implementations

4.3.5.6 Other barriers

Apart from the identified barriers under the aforementioned categories, some other barriers and their root causes were also captured through the interview findings. The coding structure relating to these barriers is presented in Figure 4.21 and the cognitive map is presented in Figure 4.22.

| Name                                                               | Files | References |
|--------------------------------------------------------------------|-------|------------|
| Barriers in climate change policy implementations in Sri Lanka     | 13    | 105        |
| Economic barriers                                                  | 10    | 11         |
| Informational barriers                                             | 9     | 14         |
| Institutional barriers                                             | 10    | 30         |
| Other barriers                                                     | 11    | 17         |
| Issues on policy formulation and implementation activities due to  | 8     | 10         |
| Lack of coherence in climate change policies and plans             | 5     | 5          |
| Not giving a main focus for research activities done on climate ch | 2     | 2          |
| Social barriers                                                    | 10    | 21         |
| Technological barriers                                             | 8     | 12         |

Figure 4.21: Coding structure for other barriers in climate change policy formulations and implementations

In here, three (03) main barriers were identified by the respondents. Among them, **“issues on policy formulation and implementation activities due to Covid-19 pandemic”** was captured by the majority of the respondents as the most significant barrier by considering the present situation of the country. As mentioned by all the respective respondents, the implementation activities have been heavily impacted due to the pandemic situation rather than policy making activities (O1, O2, O3). According to R2, the policy formulation activities are not heavily impacted where the required actions can be taken anyhow, although the pandemic is still there. For example, when revising the NDCs in recent months, physical meetings have not been held due to the restrictions imposed by the government, where the consultation processes were held through the virtual platform, as per R13. R4 also insisted that *“during this pandemic period, the consultation processes are ongoing up to a certain extent. For example, recently we gave our comments for the draft Agriculture policy before revising it. But the implementation activities have been totally affected based on in which level these policies are going to be implemented”* (O2, O3). Agreeing with this, being a

professional who engages in a climate project, R10 highlighted that it is somewhat hard to implement different actions proposed within the project with the participation of people from different levels due to the pandemic situation. As further mentioned by R10, R5 as well as R11, when implementing the relevant actions for climate change mitigation and adaptation, the authorities need to go to the field and get the involvement from the communities and other parties where human interactions will be significantly high (O4). Thus, it is really difficult to carry out those activities by maintaining social distance during this pandemic situation. So that the policy implementation activities are heavily impacted than policy formulation activities which can be considered as one of the main root causes under the main barrier.

Moreover, R2 in the view of how the Covid-19 adjustments need to be done in line with these policy implementations has not been discussed yet within the country. R2 mentioned that *"Most of the policies, action plans, strategies have been planned based on a normal life, but now we are in a new normal due to this pandemic which was not anticipated. So, how to adjust the policy implementation processes within this new normal raised by the pandemic is a huge challenge"* (O5, O6). Hence, attention needs to be paid in this direction as well in order to overcome especially the expected climate change challenges. R2 further added that the existing policies and plans need to be revised by considering the pandemic situation as well because it will highly beneficial to face such situations which may arise in the future (O7, O8). Accordingly, "lack of attention on Covid-19 adjustments along with the climate change policy implementations" can be identified as another root cause in this regard. At the same time, at this moment, the main priority was given for Covid-19 matters and thereby the climate change considerations were considerably neglected by the government, as per R4 (O9). For instance, R6 noted that *"Currently, majority of the financial provisions have been allocated for the Covid-19 matters. So, the financial allocations for the climate change matters are really low at this moment"* (O10). This idea was further endorsed by R9 as well. According to R9, this situation will lead to different future climate change challenges since the people are neglecting to contribute to overcoming the prevailing climate change challenges. Thus, the government should give proper guidance and priority continuously for implementing actions towards

climate change mitigation and adaptation within the country even during the pandemic situation. In this context, “less priority is given for climate change considerations by the government due to Covid-19” can be considered as another root cause. It is apparent that the two previous situations may further worsen due to the lack of a coherent vision of the government which was captured as an institutional barrier in Section 4.3.5.2.

The next critical barrier captured by several respondents is “**lack of coherence in climate policies and plans**”. As stressed by R2, R4 and R13, certain areas of different policies and plans are not converging together with other policies as well as the country’s development plans (O11). For example, R1 pointed out that “*Some of the targets in Biodiversity Action Plan are not that much tally with our economic development targets*”. R4 also viewed that “*What we can see in Climate Change Policy is not tally with the facts in Agricultural Policy. So, a question can raise as, are the climate change considerations properly and adequately linked to the agricultural sector through the agriculture policy?*”. Supporting this, R6 indicated that all the aspects need to be embedded and converged together when developing different policies and plans in different sectors as well as national development plans. Thus, a significant gap can be identified in policy coherence and adequate knowledge and awareness are highly required in filling these gaps, as per R9 (O12). Hence, it is proven that the poor policy coherence is highly encouraged by the lack of understanding of the stakeholders of policy making activities, which was identified as an institutional barrier in Section 4.2.6.2. In addition, another barrier was captured by R1 and R7 as “**not giving a main focus for research activities done on climate change matters**”. For example, to date, a wide variety of research studies have been conducted on climate change from different perspectives with the involvement of experienced researchers from different sectors. These research studies are highly contributing to update the existing knowledge and open more novel avenues in this direction, as strongly viewed by R1 (O13). However, studying and implementing the findings revealed through such research studies by relevant authorities is somewhat lacking within the country, as per R5 as well as R7 (O14). Hence, less attention given to implement the research studies done has become a significant issue for climate change

policy making and implementing activities largely. Actually, different solutions for a number of issues prevailing with regard to climate change mitigation and adaptation have been provided through these studies where implementing them may give significant opportunities to get an understanding of the current situation and overcome the climate change impacts in a considerable manner.

Accordingly, it is evident that some other barriers also can be identified distinctly with their root causes which lead to different obstacles in climate change policy making and implementation activities. The below Figure 4.22 shows the summarised findings under this category.

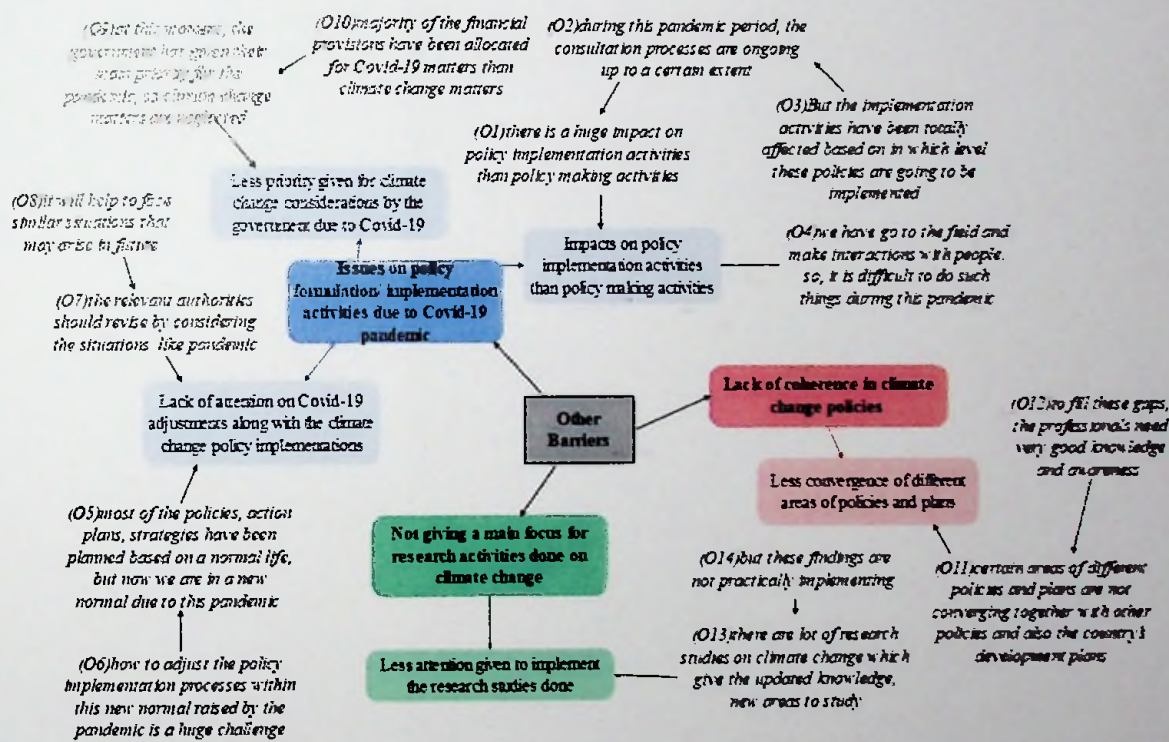


Figure 4.22: Other barriers in climate change policy formulations and implementations

Overall, this section synthesised the 18 barriers in climate change policy formulation and implementation activities in Sri Lanka along with their root causes under six main categories. Although these barriers were categorised under different categories, they are linked with each other in many ways as detailed within the discussions. It is proven through the interview findings that the majority of the barriers and root causes were

identified under the institutional category emphasising that many obstacles can come from the institutional level that makes the climate change policy making and implementing activities less effective and efficient in performance. Accordingly, the identified barriers and their root causes are succinctly presented in below Figure 4.23.

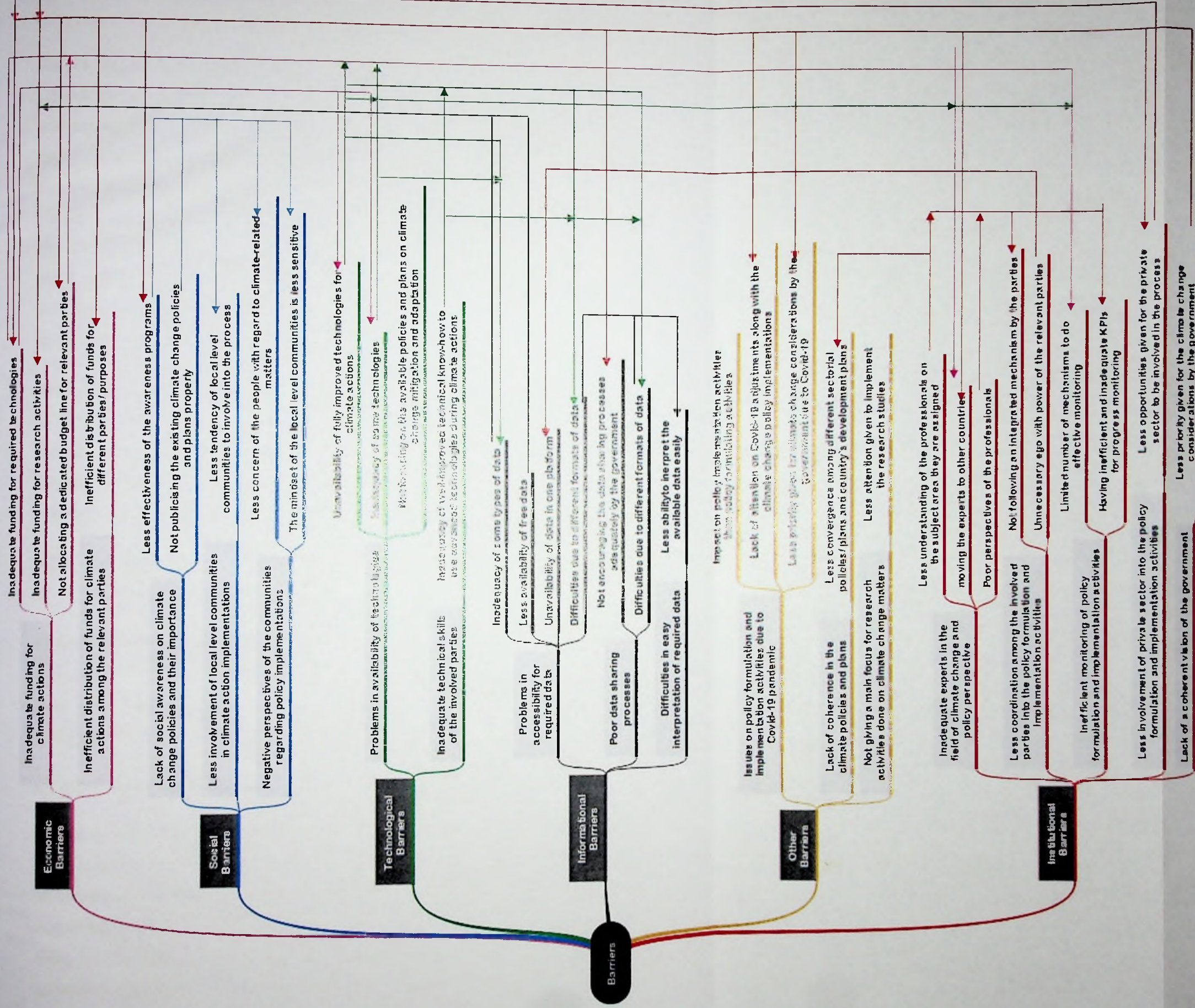


Figure 4.23: Barriers and their root causes to formulate and implement climate change policies and plans with their explicit linkages

As per Figure 4.23, the barriers and their root causes to formulate and implement climate change policies and plans come from six (06) main ways as economically, institutionally, informationally, technologically, socially and other ways. Accordingly, five (05) institutional barriers, three (03) informational barriers, two (02) economic barriers, three (03) social barriers, two (02) technological barriers and three (03) other barriers were identified. Further, they are interconnected in different ways by making the occurrence of these barriers more unavoidable. In this context, the above discussion along with Figure 4.23 gives a broad understanding on what are the major hindrances for these climate actions that come from different perspectives and how they are interconnected with each other by further worsening the situation.

Accordingly, there is an emerging necessity to follow appropriate strategies in order to overcome the identified barriers and their root causes with the intention of making climate change policy making and implementation activities more effective. Hence, having identified the barriers, the next section aims to suggest different strategies exhaustively that can be performed by relevant parties to overcome the barriers.

#### **4.3.6 Strategies to overcome the barriers to climate change policy implementations in Sri Lanka**

Since a number of barriers are available when carrying out climate change policy making and implementation activities within the current context, appropriate strategies need to be performed by the relevant parties. Accordingly, based on the interview findings, different strategies were proposed as discussed below.

##### Including climate change considerations into formal education

At present, since the awareness among the people about climate change, its causes and consequences, and ways to overcome them are at the pinnacle, a necessity can be identified to start the awareness at the beginning of education, as viewed by R8. According to R8, including climate change considerations and disaster management areas into the school level education can be considered as the beginning of creating awareness among the people. It is mainly because making the young people

knowledgeable than educating the adults is much easy to carry out. Supporting this view, R7 commented that “...if the knowledge and understanding on climate change and the related matters can be given at the school level education, it will be very effective because the IQ level of the school students is significantly high than the adults”. This idea was further strengthened by R5 stating that school children may definitely tend to learn these things in a proper way because they are highly encouraged to do so within their school education system. Not only that, according to R8, “...we can go beyond that and include these areas to the next education levels as well like education at universities”. Thus, the young generation can get an overall understanding of the related subject areas and thereby they will be encouraged to take the benefits from that knowledge and understanding to overcome the possible climate change challenges. Accordingly, the existing education system needs to be modified by the relevant authorities including the knowledge areas that the young generation needs to learn with regard to climate-related matters, as per R7. Being a country, which experiences exceeding climate change challenges day by day, Sri Lanka can be benefitted significantly by performing this strategy with a proper plan in order to ensure an enhanced awareness among the people in this regard.

#### Enhancing awareness among the communities on climate change and climate policies

When it comes to the current situation of social awareness regarding climate-related matters, it is somewhat less today as identified in the previous section. Thus, it is a necessity to further improve the social awareness among the communities, as noted by R3, R4, R6, R8, R10 and R13. In doing so, it is not enough to just inform the communities about the related areas where the effectiveness of creating social awareness needs to be highly ensured, as mentioned by R4. When these climate change policies and plans are implemented at different levels, awareness also needs to be created in accordance with those levels. For example, “...we can conduct different awareness programs, workshops, conferences etc. at different levels like divisional levels, district levels, village levels within the country targeting the people from different levels. Through these programs, we can disseminate the knowledge about how the people can contribute to these climate actions in different levels”. At the same

time, these awareness programs need to be conducted by considering the different age levels as well to improve their effectiveness, as per R3. For example, the way of conducting awareness programs for the young generation may somewhat vary from the way of conducting them for adults. Anyhow, the strong participation of the people needs to be ensured rather than just conducting them, as strongly viewed by R8. Another important aspect to be focused on in this regard is creating social awareness through social media, as emphasised by R3 and R10. According to them, the majority of the people have been connected with social media today including both young and adults. Hence, the knowledge and understanding can be effectively disseminated through social media as well up to a certain extent due to the increased tendency of people to use them. In this way, the social awareness among the communities, especially in the rural areas needs to be further strengthened to enhance their coping capacity for adverse climate change impacts.

#### Enhancing the awareness among professionals

Enhancing the awareness among the higher-level professionals is also highly paramount in formulating and implementing different climate change policies and plans, as stressed by R1, R5, R12 and R13. As per R1, more economic studies need to be carried out to insist on the severity of the climate change impacts that the country has to face today economically, socially, environmentally and so on. By identifying the current condition of the country, the professionals may tend more to formulate and implement different policies and plans to overcome the climate change impacts. At the same time, highlighting the value of investing in climate change mitigation and adaptation measures as the main way of poverty minimization is also important to be focused on by the professionals because many social inequalities can be seen within today's society, as further added by R1. That awareness needs to be created among the professionals in an advanced manner. R5 mentioned that *"...we should conduct different programs like symposiums, conferences, workshops which are specifically targeting the higher-level professionals who are involved in these processes. The knowledge should be disseminated in a way that complies with their levels"*. To date, different awareness programs have already been conducted by different ministries,

departments and institutions where more potential can be identified to further improve them, as noted by R12. At the same time, this awareness needs to be done continuously because sometimes the officers in government agencies and ministries are changing from time to time and the understanding of fast-changing climate change matters is significantly vital for them, as per R13. In addition, awareness on climate-related matters needs to be created among the private sector by highlighting their capacity to be involved in the process since their involvement needs to be further improved, as asserted by R1. Accordingly, it can be argued that it is highly paramount to enhance the awareness among professionals in the subject matter since they are the key parties who lead the process to success.

#### Empowering academic research on climate change

As discussed previously, academic researchers provide a significant contribution towards climate change policy formulation and implementation activities. Thus, improving academic research is highly beneficial in gaining novel ideas, updated knowledge and innovative solutions to overcome the increased climate change impacts within the country, as disclosed by R8. Further, it will help to enhance the awareness among the parties as well. Agreeing with this, R5 added that “...*when making and implementing different climate change policies, the updated knowledge is very much important to take different decisions. So different studies should be frequently conducted*”. At the same time, enhancing research studies will widely open different international level opportunities where Sri Lanka can get knowledge, and expertise in this regard from the global context as well, as per R5 and R8. In a such context, allocating adequate funds and resources like adequate laboratories, technologies etc. for the research activities is highly paramount to make them more fertile, as per R5.

#### Enhancing monitoring and evaluating processes of climate actions

Although different climate actions are implemented, they are not successful without effective monitoring and evaluation of their progress, as per R11. R11 mentioned that monitoring and evaluating is highly beneficial to identify the existing issues during implementations and do required changes at the appropriate times. If the current

situation of implementations is not effectively evaluated and monitored, difficulties can arise when identifying required changes and doing necessary actions. Hence, existing monitoring systems need to be further improved while introducing new monitoring systems as well since a significant gap can be seen today in this regard, as highlighted by R9. According to R6, community-based approaches need to be utilised more for monitoring purposes because the outcomes gained through such approaches will be highly beneficial to implement climate actions successfully. For example, *“...we can collect data from the communities who live in flood-prone areas or landslides-prone areas during a particular implementation of a proposed action, to get to know whether there are any changes with the implementation”*. Supporting this, R1 noted that having quantifiable tools to measure the climate action implementations in a more quantitative manner is highly paramount to get an understanding of the exact outcome of the implementation. Since different advanced technologies for such things are notably lacking within the country, the necessity of having them needs to be promoted by different sectors, as further added by R1. At the same time, the government and other responsible authorities need to allocate funds adequately for the required technological aspects in each sector to make the monitoring processes more effective. In addition, proper time plans can be followed by each sector to achieve short-term and long-term climate action goals within the process where it allows to follow different monitoring methods for progress monitoring from time to time, as per R8.

#### Improving the ways of acquiring funds for climate actions

Inadequate funds for climate actions can be identified as one of the critical issues facing Sri Lanka today as a country that is still developing. Hence, improving the ways of acquiring funds is highly important to make the policy making and implementation activities more successful, as strongly viewed by almost all the respondents. As opined by R2, an integrated approach needs to be followed for gaining finance from different sources.

- Strengthening the government funds

Gaining funds from the government is the foremost way to acquire climate finance. R2 highlighted that “...we need to make sure that the government’s development plan is integrated with climate change considerations. Then only the funds are allocated for climate action implementations adequately by the government”. At the same, the efficient distribution of available funds needs to be ensured by the relevant parties during any implementation, as noted by R4.

- Promoting private sector investments

As another way of climate financing, private sector investments need to be promoted towards climate change mitigation and adaptation measures within the country, as disclosed by R2 as well as R8. At the moment, private sectors are coming up with their own investment strategies, therefore, the government and other authorities need to identify where the private sector investments are viable and allow them to involve in the process, as per R8.

- Engaging with more international parties

Added to this, “Government can engage more with different international parties to acquire the funding support for these policy implementations”. It was supported by R2 highlighting that internationally a lot of supportive channels in terms of finance can be identified such as multilateral development banks, different specific climate funds, and many other philanthropic funding schemes where Sri Lanka has been already benefitted from such parties at the moment. Even so, the current situation has a significant potential to improve further to attain more financial support from the global context.

- Encouraging the contribution of NGOs

At the same time, R8 highlighted, encouraging the contribution of NGOs into the process as another especial way of gaining funds in this regard. It is mainly because, NGOs have the possibility of opening various avenues to gain financial support for the climate action implementations.

In this manner, effective and integrated strategies need to be followed by the government and other relevant authorities to acquire funds from different sources in order to enhance the climate finance within the country stronger than now.

#### Strengthening the available experts on climate policy development

Inadequate experts in the field was identified as the major institutional barrier in formulating and implementing different climate change policies and plans. Thus, the capacity of the available experts needs to be further improved through different ways in order to gain the best outcome from them towards this process, as emphasised by R8 and R12. R5 mentioned that providing training and development can be considered as a prominent way to enhance the capacity of the experts in their fields. Also, providing adequate technical knowledge regarding the relevant subject matters takes similar importance to strengthen the experts, as per R8. By further adding, R8 highlighted that since many novel technologies are highly needed in formulating and executing different policies and plans towards climate change mitigation and adaptation, the experts who involve in those activities should have deep technological knowledge. Therefore, providing technical know-how is significantly vital. At the same time, the experts need to be appointed for correct positions where they are more expertise and familiar with because it may be the key motive for them to give their best contribution towards their subject matters as well as to guide other parties to do the necessities accurately, effectively and efficiently, as strongly viewed by R9. Accordingly, considerable attention needs to be paid in this regard by the relevant authorities because well-experienced and knowledgeable human resources are the most prominent amongst others who can lead the whole process to success.

#### Using most recently updated policies as a guidance

Another specific strategy identified by R2 is using the most recently updated policies as a guide for future policy making and implementation activities. It is mainly because the situation within the country due to climate change is continuously changing and the required actions need to be done in accordance with those changes to reduce the risk. Hence, this can be a very effective strategy to be practiced, as strongly suggested

by R2. According to R2, the most recently updated policy document can be selected as the guidance for other policies and plans where it may highly beneficial, especially in decision-making activities to take decisions by considering the current situation of the country. For example, *“...Sri Lanka can focus on NDCs and its implementation plan because it was updated very recently. By focusing on it, we can make, revise and implement other policies and do periodic reviews to see whether we have got the expected outcomes from them based on the current condition”*.

#### Enforcing rules and regulations

Having legal and regulatory power for the relevant parties is highly paramount in making and implementing different policies and plans with the collaboration of various parties from different levels, as per R11. Supporting this view, R7 mentioned that the involved parties in this process need to have the power to get different regulatory actions during any climate implementation. For instance, *“...if there is any suggestion for an implementation from a party, the relevant authority can take decisions and say that ‘we are allocating this amount of money for this implementation and if you are unable to perform it within 3 years, we are going to cut 50% of the funding allocations’*”. If such targets can be given based on the policy or plan that needs to be reached, the relevant parties may tend to do the particular implementations within the given time period and thereby the policy implementation will become undoubtedly successful. Hence, regulatory power is highly important. At the same time, if there are people who are acting wrongly during these climate action implementation processes, the relevant authorities need to have the power to take necessary legal actions against them, as commented by R3.

#### Establishing proper mechanisms to easy access of data

Since there are many issues in data accessibility for all the required parties engaged in climate change policy making and climate action implementation activities, well-improved and structured mechanisms need to be established for easy access of data, as stressed by R4. For example, *“...recently, we have developed a repository and uploaded all the research contributions on climate change that we have done, for that*

*repository. So, we can take it as an example for getting some kinds of data together and let the relevant parties to access them".* Agreeing with this, R7 further added that it is better to have a common database including all the types of data from different institutions and agencies like Disaster Management Centre (DMC), Urban Development Authority (UDA), World Bank, Irrigation Department etc. because the accessibility of different types of data will become easier since all are in one platform. Further, it makes the policy making activities more reliable and effective because a wide variety of data needed for developing different policies and plans can be accessed through a common platform. Accordingly, establishing well-structured mechanisms for data accessibility will be another effective strategy to be performed to make the policy making and implementation activities more successful.

#### Mainstreaming climate change considerations

Mainstreaming climate change considerations into national development plans and sectorial plans of the country was identified as another major strategy to be performed to overcome the majority of the barriers in climate change policy making and implementation activities, as suggested by almost all the respondents. Indeed, integrating climate change thoughts or views into national development plans will direct for considering climate change matters as one of the main priorities of the country, as per R5. In consequence, the required resources including adequate finance and technologies will be allocated, more opportunities will be opened to get the expertise and knowledge from the global context, institutional capacity will be further improved, social awareness will be further enhanced and so on, as highlighted by R1, R4, R69, R10, R12 and R13. At the same time, if climate change considerations are integrated into different sectorial plans without considering it as a standalone aspect, the importance and applicability of these policies and plans will become significantly high, as noted by R6. For example, *"...if we pay more attention to water management, we can alleviate many issues regarding climate change matters. As an example, in the wet zone, we can get extra flood water and in dry zones, we don't have enough water. If we can think about a way of transferring excessive water in the wet zone to dry zone, it will be a good answer for many water-related issues. To do that, climate change*

*considerations and water management considerations need to be integrated properly”.* Likewise, climate-related matters need to be further embedded with national development plans as well as sectorial plans to perform the most suited climate actions for each sector at this moment and thereby to reduce the possible risk for each sector due to climate change.

#### Strengthening the institutional coordination

Less institutional coordination was captured as another main barrier in climate change policy making and implementing activities in the previous section. Thus, it is obvious that further strengthening the institutional coordination is significantly vital to make the climate actions more effective and efficient, as disclosed by R2, R4, R6, R9 and R10. As mentioned by R4, enhanced institutional coordination will help to gain the best outcome from the parties involved in the process in many ways like their knowledge, financial support, resources etc. At the same time, since climate change is not a standalone aspect to be focused on, the coordination among the parties is highly paramount to integrate the climate change considerations into different sectors and thereby to reduce the adverse climate change impacts for each sector by taking the relevant climate actions, as asserted by R6. In doing so, proper mechanisms need to be followed that enhance the interactions among the parties from different levels, as per R10. Added to this, R2 highlighted that strengthening the public-private partnerships also takes a key concern in enhancing the institutional coordination in this regard.

#### Opening chances for volunteers to involve in this process

Opening chances for volunteers was captured by R5 and R8 as another specific strategy to be performed to overcome the barriers in climate change policy making and implementation activities. According to R8, “...*there are people who are willing to engage in these policy developing and implementing processes with their capabilities. We should give them a chance*”. Supporting this view, R5 commented that since these volunteers really interested to involve in this process with their ideas and commitment, the government and other authorities need to understand what are their capabilities more distinctly. Thereafter, their capabilities can be further developed and

opportunities can be given to them to come to the field and implement their ideas, as further added by R5. Indeed, it will highly beneficial in identifying innovative ways to overcome the identified barriers and enhance climate resilience.

#### Changing the objectives of subsidies schemes

Another specific strategy identified by R10 is changing the objectives of subsidies schemes relating to climate change matters. R10 emphasised that at present, compensations are given for people when there are damages due to disasters like floods, landslides, droughts etc. where the government and other responsible parties can go beyond that. That means it would be better if the government and other responsible parties can think about a way of giving compensation for people who have increased their adaptive capacity towards climate change. For example, *“...if a person has moved to another place by considering the possible climate change impacts, how we can give him a compensation”*, as commented by R10. Indeed, it can be identified as a certain type of motivation for the people who are trying to involve in the process and reduce the climate change challenges because such a strategy will change the peoples’ attitudes in a positive manner. Hence, it will be a very good strategy to be performed since currently most of the people are in negative perspectives with regard to the importance and effectiveness of the climate action implementations. However, the climate financial strength of the country needs to be further improved in order to go for such financially strategic implementations, as further viewed by R10.

On this premise, different strategies can be applied in many ways in order to overcome the identified barriers and their root causes in climate change policy making and implementing activities. The below Figure 4.24 distinctly presents in which way the identified strategies can be applied to overcome each and every barrier and their root causes.

## Barriers

### Institutional Barriers

- Inadequate experts in the field of climate change and policy perspective
- Less coordination among the involved parties into the policy formulation and implementation activities
- Inefficient monitoring of policy formulation and implementation activities
- Less involvement of private sector into the policy formulation and implementation activities
- Lack of a coherent vision of the government

### Information Barriers

- Problems in accessibility of required data
- Poor data sharing processes
- Difficulties in easy interpretation of required data

### Technological Barriers

- Problems in availability of technologies
- Inadequate technical skills of the involved parties

### Social Barriers

- Lack of social awareness on climate change policies and their importance
- Less involvement of local level communities in climate action implementations
- Negative perspectives of the communities regarding policy implementations

### Economic Barriers

- Inadequate funding for climate actions
- Inefficient distribution of funds for climate actions among the relevant parties

### Other Barriers

- Lack of coherence in climate policies and plans
- Issues on policy formulation and implementation activities due to Covid-19 pandemic
- Not giving a main focus for research activities done on climate change matters

## Strategies

- Opening chances for volunteers to involve in this process
- Promoting private sector investments
- Strengthening the institutional coordination
- Including climate change considerations into formal education
- Establishing proper mechanisms to easy access of data
- Changing the objectives of subsidies schemes
- Enhancing monitoring and evaluating processes of climate actions
- Engaging with more international parties
- Enhancing awareness among the communities on climate change and climate policies
- Enhancing the awareness among professionals
- Strengthening the available experts on climate policy development
- Strengthening the government funds for climate actions
- Using most recently updated policies as a guidance
- Encouraging the contribution of NGOs
- Mainstream climate change considerations
- Empowering academic research on climate change
- Enforcing rules and regulations

Figure 4.24: How the identified barriers can be overcome through applying appropriate strategies

As presented in Figure 4.24, the identified barriers and their root causes can be effectively overcome through the application of identified strategies. Accordingly, 17 strategies were proposed by the respondents by considering the current situation of the country with regard to climate change policy formulation and implementation activities. For most, several possible strategies can be applied to overcome them in many ways. Hence, it is apparent through the findings that these suggested strategies are crucially in need at this moment in Sri Lanka in order to overcome the barriers to formulate and implement climate change policies and plans.

#### **4.4Chapter summary**

This chapter presented a detailed analysis of gathered data through in-depth interviews and document review. Through the findings from in-depth interviews, climate change challenges posed by climate change impacts in Sri Lanka were comprehensively identified under three main categories namely economic, social and environmental challenges. Future challenges which may arise due to climate change were also discovered. Added to this, climate change mitigation and adaptation were identified through the in-depth interviews as the ways of overcoming those climate change challenges where climate change adaptation was captured as the most suited way than climate change mitigation for a developing country like Sri Lanka. In implementing climate change mitigation and adaptation within the country, many policies and plans have been formulated and executed where several such policies and plans were initially identified through the literature review. By further strengthening those findings, several policies and plans which focus on climate change matters were newly added by the respondents as well during the interviews. Then, different barriers and their root causes to formulate and implement climate change policies and plans within the country were presented under six main categories namely economic, institutional, informational, technological, social and other barriers. At the same time, appropriate strategies to be performed in order to overcome the identified barriers were also presented. A detailed analysis of all the identified climate change policies and plans was provided through the document review. Mainly, the main focuses of those policies

and plans were highlighted and the linkages of them with each other and with international initiatives were explicitly presented through the document review.

## 5. RESEARCH FINDINGS AND DISCUSSION

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### 5.1 Introduction

The study intended to contribute towards enhancing the current policy formulation and implementation activities in Sri Lanka by identifying the available policies and plans, barriers and their root causes to formulate and implement them and finally proposing strategies to overcome them. In achieving the aim of the study, the findings from the data collection stage need to be further justified by revisiting the findings from the literature review. Thus, literature findings are used to consolidate the findings of the empirical investigation in this chapter.

### 5.2 Climate change challenges

The findings of the study revealed that being a developing country, Sri Lanka is currently experiencing a number of challenges posed by different climate change impacts. Indeed, climate change has become a global crisis today all over the world where the whole world is severely suffering from a wide variety of climate change challenges, as disclosed by Feulner (2017). This view was further endorsed by the respondents as well where they more specifically mentioned that the situation in Sri Lanka is also not differentiating from the global context. Accordingly, the challenges posed by adverse climate change impacts in Sri Lanka were distinctly identified under three main categories namely economic, social and environmental challenges (Yamane, 2009). When it comes to economic challenges, the findings exposed that the climate change impacts have made a significant influence towards the country's economy in many ways. The impact on the agriculture sector has become prominent amongst others because crop productivity has been drastically reduced in most of the countries in the world due to climate change (Masud et al., 2017). Similarly, in Sri Lanka as well, the agriculture sector has been critically impacted due to the changes in climate such as changes in precipitation patterns, changes in temperature levels, and the occurrence of natural disasters, as per the primary data. That's why Climate Change Secretariat (2016) pointed out that the agriculture sector can be identified as

one of the most sensitive sectors for climate change. According to the respondents, the quality and quantity of the yields can be significantly reduced when they face different changes in required climate conditions. This was elaborated by WBG (2020) as well stating that many climatic issues such as the impacts on water resource availability, soil erosion, alterations in CO<sub>2</sub> availability, the arrival of invasive species etc. can lead to the reduction of quality and quantity of the agriculture productivity. At the same time, a high dependency of the country's economy on fisheries can also be identified today as revealed through the findings. However, fisheries also have been critically impacted due to climate change matters like sea-level rise, temperature changes in sea water, coastal erosion, salinity intrusion etc. More importantly, Masud et al. (2017) noted that, as a result of the adverse impacts towards the agriculture sector due to climate change, world food production has been critically declined. Likewise, by considering the impact on agriculture and fisheries sectors together in Sri Lanka, it is apparent through the findings that the country's food security has been largely impacted due to climate change. At the same time, reduction of foreign exchange also can happen when the agriculture and fisheries sectors are getting severely impacted. Another major challenge that highly affects the country's economy is the increase of government expenses, as identified by the respondents. According to Eriyagama and Smakhtin (2010) and Adedeji et al. (2014), the intensity and frequency of extreme weather events have been vastly increased today resulting in a number of damages for the peoples' lives, and properties. Being a developing country, Sri Lanka is severely struggling to deal with such disaster situations. The interview findings revealed that since a considerable amount of budget needs to be allocated for responding to the disasters, peoples' health issues, redevelopment of damaged infrastructure due to climate change, and providing subsidies for the people, government's expenses can be increased further in many ways. In addition, the tourism sector is also experiencing many devastating issues due to climate change by breaking down the productivity of the sector, as captured by the respondents. Since the tourism sector can be considered as the third-largest foreign exchange earner of the country (Salpage et al., 2019), the impact on tourism sector due to climate change has been encouraged the reduction of foreign exchange of the country as well. Similarly, Sri Lanka is also experiencing the reduction of a large portion of the foreign exchange resulted from the breakdown of

the tourism sector due to climate change. Moreover, the interview findings exposed that the energy production within the country has been reduced and energy consumption patterns of the people have been changed largely due to the adverse impacts of climate change. In fact, a significant increase in energy usage can be identified across many countries in the world due to climate change issues and it has been created a large number of economic losses for those countries (Wilbanks et al., 2008). As emphasised by Hettiarachchi et al. (2014), although Sri Lanka is having abundant energy resources to ensure energy conservation, it is not satisfactorily happening today due to climate change.

When considering social challenges, the loss of livelihoods of the people was prominently identified by the respondents as well as literature findings; (Punyawardena, 2002; Withanachchi, 2019). The primary data revealed that the majority of the country's population, especially the people who are depending on agriculture, fisheries and tourism sectors, are highly vulnerable to this situation most of the time. In consequence, the living standards of the people can be highly influenced (Climate Change Secretariat, 2016). In fact, Feulner (2017) revealed that social inequalities can occur largely within the countries due to climate change issues and it has become a critical problem today all over the world. Similarly, in Sri Lanka as well, the poverty within the country can be further increased, unnecessary competition can occur among the people and many family problems also can arise, as pointed out by the respondents. At the same time, the interview findings revealed that climate migration has become a prominent challenge today in Sri Lanka as a result of the loss of livelihoods of the people. Since the majority of the rural population in Sri Lanka depends on climate-sensitive livelihoods, climate change has created a significant threat to their livelihoods and thereby climate migration issue has been largely increased than past. People may tend to migrate to different areas within the country as well as outside the country and this situation can lead to many problematic situations among the families. As affirmed by European Commission (2021), the occurrence of a number of health issues including deaths has become another great risk all over the world that resulted from the acute impacts of climate change. Equally, many health issues can arise among the communities in Sri Lanka due to the acute climate change

impacts, affecting badly towards country's economy as well because government expenses can be increased when addressing those health issues. Being a developing country, Sri Lanka is somewhat struggling to cope with these health issues most of the time, as further emphasised by the respondents. Problems in accessing safe food and drinking water have become a major reason for these health issues, especially during disaster events, as per Madurawala (2011). The respondents exposed that while intensifying the existing health issues, new health issues may also be emerged due to the continuous occurrence of adverse climate change impacts. When spreading such health issues among the communities, children and women can be more critically impacted than others, creating a key challenge to be addressed. This situation can be mostly visible in a country like Sri Lanka, which is still developing, as further emphasised by the respondents. Further, the mental conditions of the people also can be critically impacted due to climate change when their livelihoods get impacted, poverty levels are increased, family problems are increased etc., as insisted by the respondents.

When moving to environmental challenges, many of the literature findings; (Adedeji et al., 2014; Riedy, 2016; Swim et al., 2011) accepted that the major environmental challenge is the occurrence of extreme weather events. It was further endorsed by the respondents as well stating that changes in rainfall patterns, changes in temperature levels, occurring different disasters like floods, landslides, droughts etc. can be regarded as the main possible extreme weather events due to climate change in Sri Lanka. Also, the respondents revealed that water resources can be critically impacted in many ways due to climate change by reducing the quality and quantity of the water resources and resulting in issues in drinking water availability. Being a tropical country, the lack of drinking water has become one of the biggest issues in many areas of the country with relatively high temperature levels (Cho, 2020). Further, both literature; (European Commission, 2021) and interview findings revealed that although Sri Lanka is having plenty of water resources, the quality and quantity of water have been critically impacted due to climate change. Also, the biodiversity of the country has been exceedingly changed and vanished due to the adverse climate change impacts and it was captured as another environmental challenge by the

respondents. When compared to other countries, Sri Lanka is having a rich biodiversity (Kottawa-Arachchi & Wijeratne, 2017). However, a large area of forestry cover of the country has been vanished, a wide variety of species, fauna and flora are vanished, and ecosystems are changed due to climate change, as emphasised by the respondents. For example, when it comes to coastal environment with unique ecosystems, the impact of climate change on the biodiversity and ecosystem can be significantly visible.

On this premise, it is evident through both literature and interview findings that Sri Lanka is currently experiencing a wide variety of challenges posed by adverse climate change impacts. As revealed through the interview findings, each and every challenge were based on a number of issues, which shows the criticality of the current situation. These identified challenges have more potential to further increase in the future as well since climate change is increasing day by day and the appropriate actions are not adequately taken to overcome them. Hence, an emerging necessity could be identified to follow suitable methods to overcome these climate change challenges.

### **5.3 Climate change mitigation and adaptation**

Climate change mitigation and adaptation have been acknowledged as the most appropriate ways to overcome the prevailing as well as expected climate change challenges (Adedeji et al., 2014). According to both literature; (Adedeji et al., 2014; Swim et al., 2011) and empirical findings, climate change mitigation mainly targets to reduce GHG emissions to the atmosphere through human interventions. To date, many countries have become significant contributors to GHG emissions to the atmosphere, as per Lackner et al. (2015). Although it is, the contribution of Sri Lanka towards GHG emissions is considerably low when compared to other countries, as identified by the respondents. However, nowadays, Sri Lanka is becoming a significant emitter than before. Therefore, the climate change mitigation potential of the country mainly relies on several sectors and areas like the energy sector, transportation sector, industries, land usage and waste management. When considering the energy sector, even if the country is practicing several methods to reduce GHG emissions such as enhancing the energy efficiency from conventional sources, increasing the use of renewable energy and controlling cutting and burning forests (IPS, 2009), the country is still not largely

depend on such methods and has become a significant GHG emitter, as emphasised by the respondents. The same situation can be observed in transportation sector, industries, land usage and waste management as well where GHG are emitted in many ways. Thus, it can be seen that different sectors and areas have different potentials to reduce the GHG emissions in a substantial manner through implementing different mitigation measures. Majority of the countries in the world have been tended to practice a wide variety of mitigation practices to reduce the acute impacts of climate change (Mertz et al., 2009). Similarly, Hewawasam and Matsui (2019) affirmed that various institutional efforts have been undertaken in Sri Lanka as well to ensure climate change mitigation within the country. However, these mitigation actions are not adequately, effectively and efficiently implemented today within the country because those actions require heavy investments and the country is currently not having the adequate financial capacity to afford them, as per the interview findings. The respondents strongly viewed that being a developing country, Sri Lanka is not having the adequate capacity to reach more advanced levels of existing mitigation practices as well as suggest novel and innovative mitigation practices in this regard.

Thus, the empirical findings revealed that the most suited way of overcoming climate change challenges in a country like Sri Lanka is ensuring climate change adaptation than climate change mitigation. As per the arguments in literature; (Swim et al., 2011; Mertz et al., 2009) and interview findings, climate change adaptation mainly focuses on making adjustments by people, society and ecological systems to cope with the prevailing as well as expected climate change challenges posed by adverse climate change impacts. According to Watkiss and Cimato (2018), most of the countries, especially the developing countries have been involved in different adaptation measures at different spatial scales like national, subnational or regional. Likewise, in Sri Lanka as well, many adaptation measures have been implemented in different sectors like the agriculture sector, water management, energy consumption etc. by considering the current and future climate change challenges that the relevant sectors are experiencing or may have to face in the future. In doing so, the adaptive capacity of the people, sectors and the whole country needs to be prominently aimed because the successful implementation of climate change adaptation would mainly depend on

the country's vulnerability to increased climate change issues and the adaptive capacity of the country to face them (Pettengell, 2010). Although the other countries are mainly targeting strengthening their adaptive capacity, it is not effectively happening in Sri Lanka, as per the interview findings. The respondents were in doubt that whether the currently practicing adaptation measures give the best outcome to overcome the increased climate change challenges. They strongly believed that those adaptation measures have more scope to further improve in order to effectively and efficiently deal with current and future climate change challenges because the country is increasingly vulnerable to many climate change impacts.

Accordingly, it is apparent through both literature and interview findings that the currently performing mitigation and adaptation measures need to be further enhanced in many ways to successfully overcome the adverse climate change challenges. Also, the country should more focus towards climate change adaptation over mitigation due to the prevailing limitations. According to Lesnikowski et al. (2020), at present, numerous policies and plans with climate change considerations are increasingly evolving across all over the world. Sri Lanka is also benefited from such kinds of international initiatives on climate change mitigation and adaptation. In this context, different policies and plans have been formulated and implemented within the country today with the involvement of different stakeholders in order to overcome the adverse climate change impacts, as highlighted by the respondents. Currently, the government, private sector organisations, NGOs, community, researchers, international level organisations and volunteers are mainly engaging in these climate change policy making and implementing activities, as further added by the respondents. Although the whole world has been tended to practice different policies and plans towards climate change mitigation and adaptation, a number of barriers have been impeding the process (Zhao et al., 2018). Especially, this situation can be observed in most of the developing countries when compared to developed countries. Similarly, Sri Lanka is also struggling to implement existing policies and plans and to formulate new ones due to many barriers, as revealed through the interview findings. Hence, all the relevant parties need to be further encouraged to strengthen the policy formulation and

implementation process within the country to gain the best outcome from them (UNDP, 2017).

#### **5.4 Barriers to formulate and implement different climate change policies and plans**

When formulating and implementing different climate change policies and plans, a number of barriers can be seen today. These barriers were captured under six main categories namely economic, social, institutional, technological, informational and other barriers, as stressed by Masud et al. (2017). Through the empirical investigation, the root causes under each and every barrier were distinctly captured within the Sri Lankan context. At the same time, different policies and plans, which focus on climate change considerations directly and indirectly were identified through the document review with the explicit linkages of them with each other as well as with international initiatives. Accordingly, the barriers identified in general can be further related to the identified policies and plans in order to get a broad understanding of how these policies and plans can be successfully implemented, revised and used to formulate new policies and plans by overcoming the existing barriers with them. The discussion on this is presented below.

When it comes to the institutional barriers, inadequate experts in the field was captured as the biggest barrier in this regard. Indeed, experts from different areas need to be collaboratively involved in making and implementing different climate change policies and plans because strong expertise from different fields is highly needed to get the best outcome from them (Ampaire et al., 2016; Hettiarachchi et al., 2014). This can be mostly valid when formulating and implementing many of the sectorial policies and plans, as per the views of the respondents. For example, when implementing the National Agriculture Policy, revising it or formulating new ones based on it, expertise from the area of climate change only is not adequate. According to the document review, it aims to promote agricultural production within the country within an economically viable, environmentally friendly, and socially acceptable context. Within that context, climate change considerations were indirectly focused through this policy relating to different areas in agriculture such as water management,

irrigation, land use and soil conservation. Hence, expertise from all these areas is in need to implement the required actions. When considering other sectorial policies and plans like the National Action Program for Combating the Land Degradation of Sri Lanka, National Housing Policy, National Physical Planning Policy etc. the same situation can be observed. Further, this barrier may arise when formulating and implementing the policies and plans which directly focus on climate-related matters as well because many sectorial policies and plans are referred to make and revise main policies and plans, as revealed through the document review. For example, when preparing National Adaptation Plan, different sectorial policies and plans have been referred, as per the findings from the document review (refer Figure 4.1). According to Watkiss and Cimato (2018), ineffective institutional support can be identified as a prominent barrier from the institutional level, especially in developing countries. In a similar way, less coordination among the parties was identified through the interview findings as the second most significant institutional barrier in Sri Lanka where different parties are involved in making and implementing different policies and plans. This barrier may emerge when formulating and implementing almost all the identified climate change policies and plans. For example, as per the document review, the updated NDCs presents an ambitious, quantified and robust assessment of mitigation and adaptation potential of the country for the next decade with an extensive stakeholder consultation process. Also, very recently, the draft of the National Agriculture Policy was made available for the comments of different parties before revising it, as per the interview findings. Thus, it is obvious that many stakeholders are involving in this process and strong coordination among these parties is significantly vital to get the best outcome from them. This idea was elaborated by Hettiarachchi et al. (2014) as well stating that although the responsibilities of making and implementing different policies and plans need to be divided across many parties, it is not adequately happening today in Sri Lanka. In such situations, less integration among the involved parties and unnecessary ego with the power of the relevant parties may arise, which were captured as the root causes for less coordination among the parties during the empirical investigation. In addition, inefficient monitoring processes was identified as another barrier under this category through the interviews which can also be applied to almost all the policies and plans. It is mainly because, when initiating and

implementing any policy or a plan, the outputs of them need to be properly monitored and evaluated in a timely manner by the respective parties in order to accomplish their ultimate goals successfully (Panditharatne, 2016). Through the document review, it can be seen that many strategies, actions, targets have been proposed in these policies and plans in a different manner with the ultimate target of climate change mitigation and adaptation for the whole country or a particular sector (refer Annexure I). If those proposed actions are started to implement, effective monitoring processes definitely should be there for progress monitoring. However, interview findings revealed that it is not currently happening today adequately due to the inadequate mechanisms to do effective monitoring and inadequate and inefficient KPIs for progress monitoring. For example, in National Climate Change Adaptation Strategy for Sri Lanka, a number of adaptation measures were included in a detailed manner under five main strategic areas. When implementing those proposed measures, efficient progress monitoring is significantly vital for the continuation of the implementations. Likewise, most of the policies and plans, especially the policies and plans that directly focus climate change matters are in need of effective monitoring mechanisms to implement the proposed actions. At the same time, it could be seen through the document review that the relevant KPIs for the proposed actions were not included within those policies and plans. Therefore, it would be better if relevant KPIs can be included within these policies and plans in order to give a prior idea about how the proposed actioned need to be achieved. Furthermore, Watkiss and Cimato (2018) mentioned that the government failures can happen in most of the time in developing countries where it can directly affect for the policy failures. It was proved through the interview findings as well where lack of a coherent vision of the government was captured as another institutional barrier to formulate and implement climate change policies in Sri Lanka. Actually, government has a leading role to play in this process where it can provide their contribution as an educator, regulator, facilitator and service provider in formulating and implementing these climate change policies and plans (IPS, 2009). However, interview findings exposed that many areas like water management are still remaining as the uncovered areas through the climate change policy framework of the country since the government is not giving main priority for them. Further, when concerning the current pandemic situation of the country, the proposed actions under

the identified policies and plans are not effectively implemented since they are completely neglected by the government. Hence, it has become a critical institutional barrier as identified by the findings of the study. Moreover, less involvement of the private sector in the process is another identified barrier through the interviews which can be applied for almost all the policies and plans. For example, in CDM Policy, different CDM projects implemented by different organisations were included where the majority of those projects were implemented by private sector organisations. Basically, this policy aimed to reduce GHG emissions, enhancing national capacity in this regard and ensuring that these CDM projects contribute to accomplish the national goals of sustainable development, as per the document review. It was obvious through the findings of the document review that the private sector has a significant capacity to involve in this process and make it more successful. Anyhow, this policy has been outdated now, however, has the capacity to initiate new policies or action plans based on it to continue the private sector involvement to reduce GHG emissions. In doing so, less opportunities given for the private sector to be involved into the process may become a barrier to implement those newly emerged policies and plans, as captured by the respondents.

Under the informational barriers, three main barriers were identified with their root causes through the interview findings. Amongst them, problems in data accessibility was captured as the most prominent barrier. The respondents were strongly in the view that when formulating and implementing different climate change policies and plans, it is imperative to have adequate and appropriate information in every aspect regarding climate-related issues. Even so, many problems have been arising due to inadequacy of some types of data, less availability of free data, unavailability of data in one platform and difficulties due to different formats of the data, as per the empirical investigation. For example, the document review revealed that Sustainable Financing Strategy by Central Bank is mainly focusing on enhancing sustainable finance to manage environmental, social and governance risks in the projects in an effective manner with the aim of becoming them greener, climate-friendly and socially inclusive. In doing so, having more accurate and adequate data regarding climate financial aspects is significantly vital. Furthermore, according to Hewawasam and

Matsui (2019), the National Climate Change Policy of Sri Lanka was identified as one of the major policy documents which focus on addressing the extreme impacts of climate change facing Sri Lanka efficiently and effectively. As identified through the document review, the guidance provided through this policy is highly paramount to make the communities aware of the country's vulnerability to adverse climate change impacts and taking appropriate adaptation and mitigation actions. When proposing different actions through this policy, adequate data with regard to each and every aspect of climate change is highly needed because it is directly focusing on overcoming the climate change challenges. Likewise, it is obvious that data accessibility has become a crucial requirement in making and implementing different climate change policies and plans. Hence, problems in data accessibility may occur in most of the time during the formulation and implementation of these policies and plans in many ways as discussed in Section 4.3.5.3. This was emphasized by Wijenayake and Mombauer (2019) in their study as well stating that poor data accessibility has become a critical barrier to formulating and implementing different policies and plans in most of the developing countries. Added to this, poor data sharing mechanisms was captured through the interview findings as another main barrier in this direction because although required data are available, the relevant parties may be unable to come up with their decisions if the relevant data are not properly shared (Wijenayake & Mombauer, 2019). The empirical findings emphasised that data sharing processes may become more difficult due to the different formats of the data and less encouragement given by the government for data sharing. Especially when it comes to the policy making stage, different stakeholders are involved and the required data need to be shared among those parties effectively and efficiently. As identified through the document review, these policies and plans are interconnected in many ways (refer Figure 4.1) where different policies and plans are used when formulating new ones or updating existing ones. In such situations, effective data sharing among different parties is predominantly vital. However, currently, it is not happening in an effective manner, as captured through the interview findings. Added to this, difficulties in easy interpretation of data was also identified as another informational barrier by the respondents because a wide variety of data and information from different areas are needed in formulating and implementing these policies and plans. All these

informational barriers may arise during the revising, formulating of new ones and implementation of identified policies and plans.

Under the social barriers, three main barriers were identified with their root causes through the interview findings. Among them, lack of social awareness was captured as the main social barrier to climate change policy implementations. Social inclusion for formulating and implementing climate change policies and plans highly matters in any country because communities are the highly vulnerable party for the adverse changes in climate (Ampaire et al., 2016). When it comes to the developing countries, the situation is more critical where the majority of them are highly vulnerable to climate change (Butler, 2018). However, the knowledge level and the understanding of the communities on climate change matters is notably lacking in those countries most of the time (Gonzalez-Hernandez et al., 2019). As revealed through the interview findings, in Sri Lanka, less social awareness is mainly driven by less effectiveness of the awareness programs and not publicising the existing climate change policies and plans adequately. As further pointed out by the interview findings, although many awareness programs are conducted within the country, their effectiveness is considerably low. At the same time, although some of the policies and plans are available in different languages, some are available in the English language only. Thus, people are struggling to extract the content of such policies and plans. In consequence, the social awareness in this regard has become somewhat less as per the interview findings. As disclosed by Wijenayake and Mombauer (2019), this less understanding of the people with regard to climate-related matters may lead to emerge negative perspectives among the people regarding these climate actions. It was captured as another social barrier to climate action implementations in Sri Lanka during the empirical investigation. It was driven by two root causes which are less concern of the people in this regard and the less sensitive mindset of the local communities in this regard. Further, community involvement in the process is also lacking in Sri Lanka, as emphasised by the respondents. People have not been tended adequately to implement the proposed climate actions mostly due to the less understanding and negative perspectives they have in this regard. In fact, these social barriers can be seen when implementing all the identified policies and plans because all are mainly focusing on



overcoming the climate change challenges directly or indirectly which are experiencing the people from different levels, sectors and areas. For example, the National Climate Change Policy mainly focuses on making communities aware of the country's vulnerability to climate change and taking suitable measures to avoid or minimise the impacts on livelihoods and ecosystems. Further, National Adaptation Plan targets different adaptation needs of the communities under several sectors while the National Climate Change Adaptation Strategy for Sri Lanka proposes different adaptation measures under five main areas to be performed on behalf of the communities, as per the findings of the document review. At the same time, when considering sectorial policies and plans like National Agriculture Policy, National Housing Policy etc. they mainly target the communities relate to those particular sectors where they should have a broad idea about how the policy content can assist them to overcome the related climate change issues. Overall, the communities need to have an extensive understanding of these facts to get the best outcome from these policy implementations.

When it comes to the technological barriers, problems in available technologies was identified through the interview findings as the most critical barrier to formulate and implement different climate change policies and plans in Sri Lanka. According to Clements et al. (2011), technological support plays a key role in making climate change policy implementations more effective and efficient. However, as revealed through the interview findings, some available technologies are not fully improved and some required technologies are not available in our country. It was elaborated by Wijenayake and Mombauer (2019) as well mentioning that the availability of advanced technologies to strengthen the climate change policy implementations seems to be significantly lacking within the country. Especially when it comes to climate change mitigation actions, different advanced technologies are highly required than adaptation measures. On the whole, the proposed actions towards climate change mitigation and adaptation under these identified policies and plans are in need of many advanced technologies. However, the said problems in available technologies may interrupt the implementation of those proposed actions in most of the time. More importantly, Axon (2010) highlighted that the use of advanced technologies can be a

reasonable cost to a country. Similarly, the respondents also exposed that the financial issues can highly deepen this situation in a country like Sri Lanka which is still developing, because advanced technologies require higher investments to utilise. At the same time, not focusing on the available policies and plans with regard to technological aspects in climate change was identified as another root cause for the said barrier in Sri Lanka by the respondents. Indeed, the document review pointed out that Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation and Adaptation mainly aim at identifying and assessing the environmentally sound technologies that can be used to reduce the extreme impact of climate change and the rate of GHG emissions. These policy documents will be a strong foundation to identify the existing technologies, issues with them, the requirement of new technologies and so on in order to make the technological support for climate change mitigation and adaptation strong. However, they are not adequately utilised in decision-making and other activities to enhance the technical capacity of the country, as strongly viewed by the respondents. Added to this, another barrier was identified as inadequate technical skills of the involved parties. The technical know-how of the relevant parties to use novel and innovative technologies is somewhat lacking today. Thus, as disclosed by Hewawasam and Matsui (2019), there is a crucial requirement of performing appropriate actions by the responsible parties for empowering the technical capacity of the country towards these policy implementations. More importantly, these technological barriers may highly arise when implementing policies and plans which give more weight to climate change mitigation such as CDM Policy, Technology Action Plans for Climate Change Mitigation, and National Action Plan for Haritha Lanka Programme.

Under economic barriers, two main barriers were identified with their root causes through the empirical investigation. Inadequate funding for climate actions was captured as the most important economic barrier among the two of them in Sri Lanka. In general, successful climate change policy formulation and implementation activities are mainly driven by adequate funding within the country (Hettiarachchi et al. 2014). However, Masud et al. (2017) insisted that inadequate financial support can be regarded as a key economic hindrance in most countries. Equally, at present, Sri Lanka

is also suffering from many financial issues where available funding is not adequate for required technologies, and research activities to be conducted with regard to climate change matters, as per the empirical investigation. The empirical findings further revealed that an adequate budget line is not allocated most of the time for the relevant parties making their contribution to the process less effective. Since Sri Lanka is a developing country, the status of climate finance is not adequately stable, as elaborated by Thathsarani and Gunaratne (2018) where it was further endorsed by the respondents as well. In fact, this situation can mostly be applicable when it comes to climate change mitigation than adaptation because when implementing climate change mitigation measures, different advanced technologies are highly needed over adaptation measures. Thus, the required finance is considerably high for climate change mitigation measures. Actually, Sustainable Financing Strategy by Central Bank mainly focuses on how to enhance sustainable finance within the country towards greener, climate-friendly and socially inclusive future. It has identified financial issues in this regard and proposed key actions to be performed under one among three main objectives which is aiming at facilitating climate finance required for Sri Lanka to achieve SDGs, as per the document review. Furthermore, inefficient distribution of funds among the parties was captured as another economic barrier in this regard, as per the interview findings. When implementing all these policies and plans, the said financial issues can definitely arise because the targets of these policies and plans are very much complex and cover a broad area at once for a longer period of time. For example, many of the literature findings; (Butler, 2018; Hewawasam & Matsui, 2019) accepted that the adoption of NDCs under the Paris Agreement is one of the foremost commitments with regard to overcoming the climate change challenges where it has provided a number of climate change mitigation and adaptation targets to be achieved to overcome the climate change challenges within next decade by covering many areas. At the same time, when considering National Adaptation Plan, it has proposed a number of initiatives by addressing many adaptation needs in general as well as sector-wise by overcoming the climate change challenges for the period of 2016-2025, as per the document review. Hence, the possibility of occurring the climate financial barriers is significantly high during the formulation and implementation of these policies and plans.

The last category identified many other barriers to formulate and implement different climate change policies and plans apart from the identified economic, social, institutional, informational and technological barriers in Sri Lanka. The main barrier identified through the interview findings under this category is issues on the climate change policy formulation and implementation activities due to the Covid-19 pandemic situation within the country. Due to the pandemic situation, many of the policy implementation activities have been interrupted than policy making activities because when implementing climate actions, it is difficult to maintain social distance among the people, as identified through the interview findings. Hence, policy making activities are continuing somehow even during the pandemic situation. For example, when considering about NDCs and National Agriculture Policy which were recently updated during this pandemic situation, most of the consultation activities were carried out through virtual platforms. At the same time, the empirical investigation further exposed that currently the government has been significantly neglected climate change matters because their main priority was given for Covid-19 mitigation. Moreover, the respondents emphasised that how the Covid-19 adjustments need to be done along with climate change considerations were not discussed yet by the relevant parties. Actually, overcoming this barrier 'issues due to Covid-19 pandemic' will be highly beneficial in facing similar situations that may arise in the future along with addressing climate change matters as well. Hence, the government and other parties need to focus on revising the existing climate change policies or formulate new policies and plans by including Covid-19 considerations as well. Another barrier identified by the respondents under this category is lack of policy coherence which means different areas included in the climate policies and plans are not converging together. Indeed, this situation can be mostly applied when developing main policies and plans based on many other policies and plans. As depicted in Figure 4.1, when developing most of the policies, many other policies and plans have been referred. However, in doing so, this lack of policy coherence can happen due to many reasons like less understanding of the involved parties, lack of experts from different areas, problems in data availability etc. which were captured as the barriers under other categories. Hence, all the areas related to climate change need to be thoroughly reviewed and assessed by the relevant parties when revising or formulating new policies and plans. The empirical findings

discovered another barrier under this category as not giving the main focus for research activities done on climate change matters. In fact, based on these identified policies and plans, many research activities have been done targeting many prevailing climate-related issues. They have provided very innovative and novel ideas through extensive analysis processes, which can be highly beneficial in implementing climate actions. Even so, they are not properly referred or utilised by the relevant parties when implementing the climate actions, as strongly viewed by the respondents.

On the whole, it was proven through the findings from literature review, and in-depth interviews that a significant possibility can be identified to occur different types of barriers when formulating and implementing climate change policies and plans. The document review further unveiled that currently different policies and plans are available which are directly and indirectly focusing on climate change matters, however are not effectively implemented due to the above-mentioned barriers and their root causes. Hence, when further revising these existing policies and plans, implementing them and formulating new ones based on them, these barriers and their root causes need to be properly overcome by applying the appropriate strategies, as detailed in Section 4.3.6.

The summary of the findings captured through the entire study is depicted in relation to the research objectives in below Figure 5.1.

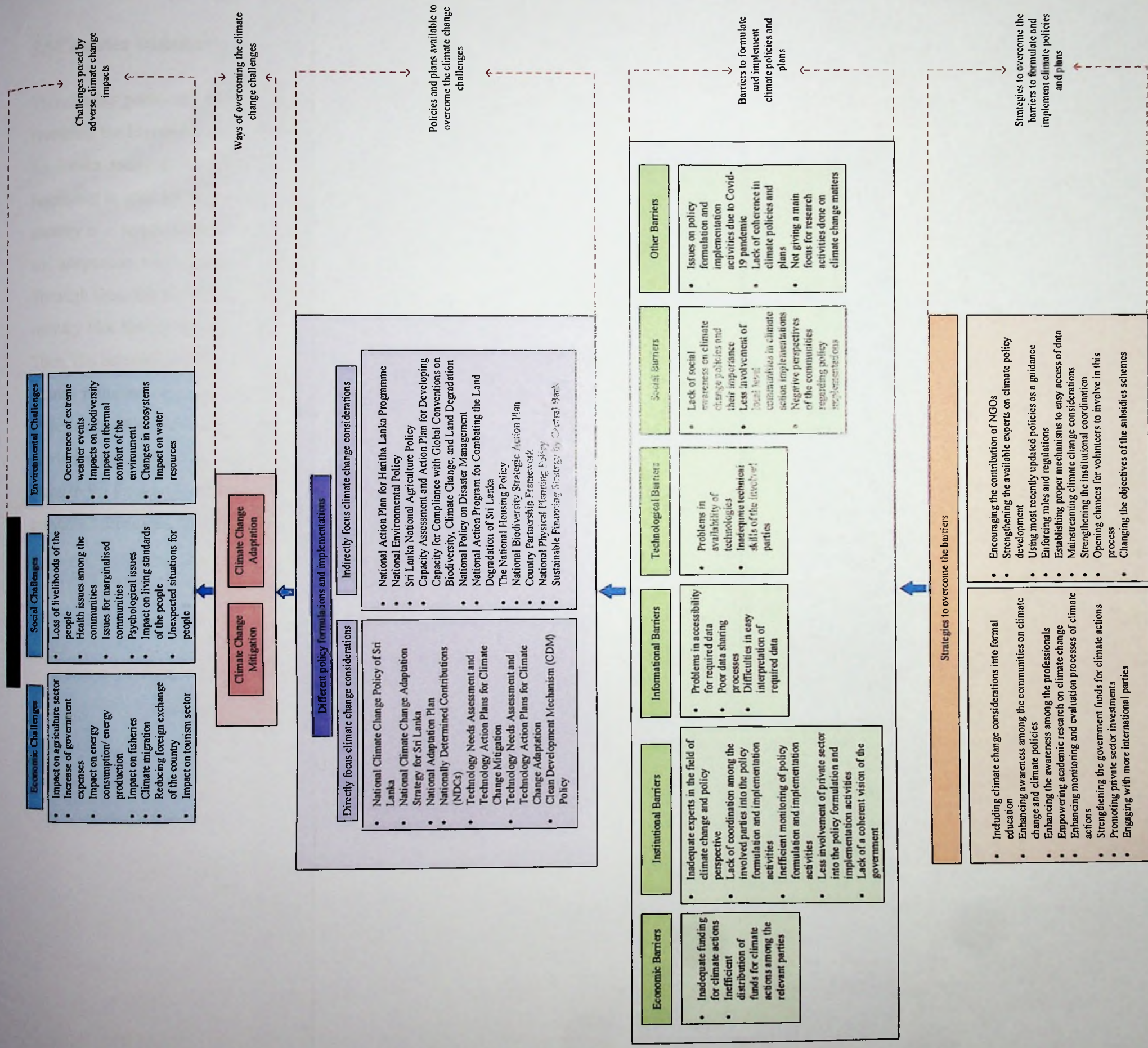


Figure 5.1: Summary of the findings of the study

## 5.5 Chapter summary

This chapter presented a detailed discussion of the findings captured in Chapter 4 by revisiting the literature findings from Chapter 3. The climate change challenges facing Sri Lanka today posed by adverse climate change impacts were discussed at the beginning to gain an understanding of how disastrous the current situation within the country is in terms of climate change. Thereafter, the role of climate change mitigation and adaptation was explored in overcoming the identified climate change challenges. Through that, the suitability of climate change adaptation rather than mitigation to a country like Sri Lanka with many eroded economic conditions was further explored. Then, the barriers and their root causes to formulate and implement different climate change policies and plans identified through the in-depth interviews were expounded by reflecting the barriers identified in the literature review. Furthermore, the identified barriers were further discussed in relation to the prevailing climate change policies and plans in Sri Lanka. As a final note, the summary of the findings of the entire study was presented through a figure in relation to the research objectives achieved.

## 6. CONCLUSION AND RECOMMENDATIONS

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### 6.1 Introduction

This chapter focused on deriving conclusions of the entire study based on the achievement of four objectives through the literature review, data analysis and the discussion on the forgoing chapters. Furthermore, the contribution of the study to theory and practice was also highlighted in this chapter. Recommendations were proposed based on the entire study in order to contribute towards enhancing the climate change policy formulation and implementation activities in Sri Lanka towards successful climate change mitigation and adaptation. In addition, certain limitations of the study were acknowledged and future research areas were proposed to further expand the current study in other related directions.

### 6.2 Accomplishment of objectives

The aim of this study was to contribute towards enhancing the policy formulations and implementations towards climate change mitigation and adaptation in Sri Lanka. The aim was achieved through the accomplishment of four main research objectives. The conclusions derived under each research objective can be presented below in a detailed manner.

#### **Objective 01: To identify the challenges posed by climate change impacts globally and with reference to Sri Lanka**

Initially, climate change was extensively reviewed prior to the identification of climate change challenges in relation to the global context (Section 3.2) and Sri Lankan context (Section 3.3). Thereafter, challenges posed by adverse climate change impacts were explored through the literature review (Section 3.4) and empirical investigation (Section 4.3.1).

Through the literature review, impact on agriculture, global food production, health and well-being of the people, and water resources, increase of poverty levels, increase of energy consumption, economic losses due to the impact on different sectors like the

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Through the literature review, impact on agriculture, global food production, health and well-being of the people, and water resources, increase of poverty levels, increase of energy consumption, economic losses due to the impact on different sectors like the

manufacturing sector, commercial sector, marine activities etc. were captured as the challenges posed by acute climate change impacts within the global context (Section 3.4). Moreover, the climate change challenges were extensively reviewed through the literature review in relation to the Sri Lankan context as well (Section 3.4.1). Those challenges were identified under three (03) main categories namely economic challenges (Section 3.4.1.1), social challenges (Section 3.4.1.2) and environmental challenges (Section 3.4.1.3). Through the empirical investigation, these economic, social and environmental challenges posed by adverse climate change impacts in Sri Lanka were more specifically and extensively identified based on the opinions of the respondents (Section 4.3.1). Impact on the agriculture sector, impact on fisheries, an increase of government expenses, climate migration are some of the economic challenges identified through the empirical findings. Added to this, loss of livelihoods of the people, issues for marginalised communities, health issues among the communities, psychological issues can be regarded as some of the social challenges while the increased occurrence of extreme weather events, impact on water resources, changes in the ecosystem can be regarded as some of the environmental challenges identified. Ultimately 18 climate change challenges were identified in relation to the Sri Lankan context through the data analysis. At the same time, it was apparent through the findings that these climate change challenges are interconnected with each other in many ways making their severity higher. Accordingly, the identified climate change challenges were extensively presented with their explicit linkages in Figure 4.8. Apart from the prevailing challenges due to climate change impacts, future challenges were also explored through the empirical investigation (Section 4.3.2). Accordingly, intensifying existing health issues, emerging new, unknown diseases, increase of climate migration, increase of intensity of the disasters, increase of vulnerable population within the country and the impact on safe water availability within the country can be identified as some examples for those future challenges that may occur in Sri Lanka due to climate change. Having identified the prevailing situation within the country due to the challenges posed by adverse climate change impacts, the necessity of overcoming them through climate change mitigation and adaptation was highlighted.

**Objective 02: To investigate the available policies and plans to fuel the climate change mitigation and adaptation in Sri Lanka**

The importance of climate change mitigation and adaptation was critically reviewed through the literature review in the global context (Section 3.5) and in the Sri Lankan context (Section 4.3.3). From that, it was identified that currently, a wide variety of policies and plans towards climate change mitigation and adaptation have been initiated and implemented at the global level as well as within the Sri Lankan context (Section 3.6). According to the literature findings, the Paris climate change agreement, Sendai Framework for Disaster Risk Reduction, Cancun Adaptation Framework are some of the international initiatives which directly ensure climate change mitigation as well as adaptation across the countries. Further, it was identified that most of the developing countries including Sri Lanka can be regarded as the countries where the policy network towards climate change mitigation and adaptation has a lot of room for improvement. Accordingly, National Climate Change Policy, National Climate Change Adaptation Strategy for Sri Lanka, National Adaptation Plan, NDCs, CDM Policy, National Action Plan for Haritha Lanka Programme can be considered as some examples for the climate change policies and plans identified through the literature review. Apart from those policies and plans, several other climate policies and plans were captured through the in-depth interviews (Section 4.3.4) such as National Biodiversity Strategy and Action Plan, Sustainable Financing Strategy by Central Bank, Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation/ Adaptation, National Physical Planning Policy and Country Partnership Framework. Thereafter, a document review was carried out in order to identify the key highlights of these policies and plans (Section 4.2.2 and Annexure I) and the linkages among these policies and plans with each other as well as with international initiatives (Section 4.2.3). In doing so, the identified policies and plans were categorised under two main categories as policies and plans which focus on climate change considerations directly and indirectly. On the whole, 18 documents were reviewed. The findings gathered through the document review were succinctly presented in Figure 4.1. Indeed, the findings from the document review contributed to gain a broader understanding of the climate change policy network in Sri Lanka.

Thereby it provided a base to further analyse the barriers identified under Objective 03 in relation to the existing policies and plans to see how these barriers can occur when implementing the existing ones, revising them and formulating new ones based on them.

**Objective 03: To investigate the barriers and their root causes in formulating and implementing climate change policies and plans in Sri Lanka**

It was identified that although a number of policies and plans are available within the country, they are not effectively implemented, or revised as well as new policies and plans have not emerged. Thus, the necessity of investigating the prevailing barriers in this regard was emphasised. In this context, the barriers to formulating and implementing climate change policies and plans were extensively reviewed through the literature in the global context as well as the Sri Lankan context (Section 3.7). These barriers were identified under six (06) main categories namely economic, institutional, informational, technological, social and other barriers. Accordingly, inadequate financial provisions, lack of social awareness regarding the climate change mitigation and adaptation, poor institutional collaboration, inadequate advanced technological developments, inadequate climate change data and information, and governance issues of the policy implementations are some examples of such barriers identified through the literature review. Through the data analysis, a number of barriers were captured with their root causes to formulate and implement climate change policies and plans in Sri Lanka under the aforementioned categories (Section 4.3.5). Under the economic barriers, inadequate funding for climate actions and inefficient distribution of funds for climate actions among the relevant parties were identified while inadequate experts in the field of climate change and policy perspective, lack of coordination among the involved parties into the policy formulation and implementation activities, inefficient monitoring of policy formulation and implementation activities, less involvement of private sector into the policy formulation and implementation activities and lack of a coherent vision of the government were captured as the institutional barriers. Also, problems in accessibility for required data, poor data sharing processes and difficulties in easy interpretation of

required data were identified under the informational barriers, problems in availability of technologies and inadequate technical skills of the involved parties were captured under the technological barriers, lack of social awareness on climate change policies and their importance, less involvement of local level communities in climate action implementations and negative perspectives of the communities regarding policy implementations were regarded as the social barriers and issues policy formulation and implementation activities due to Covid-19 pandemic, lack of coherence in climate policies and plans and not giving the main focus for research activities done on climate change matters were identified under the other barriers. Under each barrier, the root causes were comprehensively investigated to get to know about the actual issues prevailing within the country under each barrier. Altogether 18 barriers to formulate and implement climate change policies and plans in Sri Lanka were explored with their root causes, as depicted in Figure 4.23. Having identified these barriers and their root causes, the necessity of overcoming them through appropriate strategies was highlighted with the intention of enhancing the climate change policy formulation and implementation activities since the country is exceedingly vulnerable to climate change.

**Objective 04: To determine the strategies to overcome the barriers to enhance the climate change mitigation and adaptation in Sri Lanka**

The identification of barriers and their root causes to formulate and implement different climate change policies and plans towards climate change mitigation and adaptation urged the necessity of applying appropriate strategies to overcome them. It is mainly due to the crucial requirement of a strong climate change policy network for the country which is becoming more vulnerable to climate change day by day. Accordingly, different strategies were reviewed to overcome the barriers in climate change policy formulation and implementation activities within the global context in Section 3.8. Based on the data analysis, strategies were proposed in relation to the Sri Lankan context in order to overcome the identified barriers under Objective 03 (Section 4.3.6). Including climate change considerations into formal education, improving the ways of acquiring funds, strengthening the available experts on climate

policy development, using the most recently updated policies as guidance, mainstreaming climate change considerations, strengthening the institutional coordination are some of those proposed strategies in this regard. At the same time, how the identified barriers can be overcome through applying the proposed strategies is distinctly presented in Figure 4.24.

Ultimately, by considering the findings of the entire study, it was deduced that the identified barriers and their root causes are the most prevailing issues to be focused at this moment in Sri Lanka when formulating new climate change policies and plans as well as revising and implementing existing policies and plans. Due to those barriers, the climate change policy network of the country has areas that can be identified as requiring more careful consideration for improvement. Hence, the suggested strategies are evidence-based and address the critical needs and gaps at this moment to overcome the contemporary barriers and thereby strengthen the policy formulation and implementation activities in Sri Lanka towards successful climate change mitigation and adaptation.

### **6.3 Recommendations**

The recommendations to contribute in enhancing policy formulation and implementation activities towards climate change mitigation and adaptation in Sri Lanka can be listed below.

- **Consideration of the identified barriers in formulating and implementing climate change policies and plans**

The study revealed a number of barriers and their root causes prevailing within the country in formulating and implementing different climate change policies and plans. These barriers need to be thoroughly considered when implementing and revising existing policies and plans as well as formulating new policies and plans based on the existing ones.

- **Allocation of funds to perform the suggested strategies to overcome the identified barriers and their root causes**

In order to overcome the prevailing barriers and their root causes in formulating and implementing climate change policies and plans, a number of strategies were proposed through this study. These strategies need to be effectively performed by the involved parties in this process. To do that, steps need to be taken by relevant authorities to allocate adequate funds to perform these strategies within the country.

- **Enhance the awareness among the communities with regard to climate change matters within the country**

The occurrence of climate change impacts is increasing day by day within the country and the communities are becoming more and more vulnerable to these climate change impacts. Hence, the awareness among the communities with regard to the climate change challenges they are facing, how they are becoming more adverse, future challenges that may arise, the importance of different policies and plans to overcome them, how the communities can contribute in implementing climate actions and so on, as revealed through this study needs to be further enhanced at different levels within the country.

- **Encouraging the relevant parties to pay more attention to available climate change policies and plans**

As exposed through this study, different policies and plans which focus on climate change considerations, directly and indirectly, are significantly available within the country. The attention paid by the relevant parties needs to be further enhanced to make them effectively utilised in the process of overcoming the prevailing and expected climate change challenges.

## **6.4 Contribution to theory**

This study revealed a number of challenges posed by climate change impacts (Section 4.3.1), the importance of climate change mitigation and adaptation in overcoming them (Section 4.3.3), the available policies and plans towards climate change mitigation and adaptation (Section 4.2), barriers and their root causes to formulate and implement those policies and plans (Section 4.3.5) and strategies to overcome the identified barriers (Section 4.3.6) within the Sri Lankan context.

When considering the challenges posed by climate change impacts, a number of studies have been carried out in this area within the global context (Feulner, 2017; Wilbanks et al., 2008; European Commission, 2021; Adedeji et al., 2014) as well as the Sri Lankan context (Hettiarachchi et al., 2014; Cho, 2020; Eriyagama et al., 2010; Kottawa-Arachchi & Wijeratne, 2017). However, in these studies, challenges due to climate change impacts were discussed in relation to different areas. For instance, some studies were based on the climate change challenges on the energy sector (refer Wilbanks et al., 2008), communities (refer Hettiarachchi et al., 2014) and biodiversity and ecosystems (refer Kottawa-Arachchi & Wijeratne, 2017) while some studies have been discussed the challenges in a general manner (refer Adedeji et al., 2014; Eriyagama et al., 2010). Accordingly, even though these studies have been provided a common view on the challenges due to climate change, they are not extensively explored by considering all the vulnerable areas such as economic development of the country, social well-being and natural environment. Thus, this study addresses this gap and enhances the current state of the art by contributing to the theory by broadly identifying and further analysing the challenges posed by climate change impacts economically, socially and environmentally in Sri Lanka. When considering the policies and plans available on climate change, many studies have been just discussed different climate change policies and plans (Hewawasam & Matsui, 2019; Eriyagama & Smakhtin, 2010). For instance, the study; (Hewawasam & Matsui, 2019) have been focused on historical development of climate change policies and CCS in Sri Lanka while the study; (Eriyagama & Smakhtin, 2010) have pointed out different policies and plans as the mitigation and adaptation options. However, a critical exploration of available climate change policies and plans have not been done in those studies. Hence some of the aspects such as how these policies and plans have been formulated or revised, what are the interlinks between the local policies and plans, what are the interlinks between the local ones and the international initiatives etc. have not been adequately explored. In this context, this study contributes to the theory by critically exploring different policies and plans which focus climate change considerations directly and indirectly and identifying explicit linkages among them with each other as well as with international initiatives.

The general literature has been identified different barriers to formulate and implement climate change policies and plans (Ampaire et al., 2016; Masud et al., 2017; Watkiss & Cimato, 2018; Mahanama et al., 2014). In these studies, barriers to formulate and implement climate change policies and plans were investigated in a general way. However, the current study contributes to the theory by exploring these barriers in a detailed manner through the identification of the root causes for each and every barrier. Furthermore, the explicit linkages among those barriers were also captured through this study. Having identified these barriers, the study further contributes to the theory by carrying out a critical discussion to see how these barriers can relate with the previously identified policies and plans. Accordingly, the way of occurring these barriers when implementing and revising the existing climate change policies and plans and formulating new ones based on the existing ones was also explored.

Altogether, this study contributes to the current theory by integrating various knowledge bases in terms of climate change and its policy perspective in order to further strengthen the existing climate change policy network within the country. For instance, the policymakers and other respective parties can focus more on formulating different policies and plans by addressing the economic challenges posed by adverse climate change impacts or social challenges posed by adverse climate change impacts etc. Further, in doing so, the identified barriers can relate to such policies and plans and those barriers can be addressed in an appropriate manner through the suggested strategies. Likewise, various knowledge bases derived through this study can be integrated in different ways to see novel aspects in climate change policy making and implementation processes. More importantly, these knowledge bases are traditionally developed based on the own agendas of the relevant parties, whereas this study combined those knowledge bases in enhancing the current state of the art.

## **6.5 Contribution to practice**

The end results of the study could be utilised by the respective industry practitioners involved in climate change policy formulation and implementation practices. Since the study provides a detailed investigation on the barriers to formulate and implement climate change policies and plans within the country, a broad understanding could be

gained on how the prevailing policies and plans need to be updated and implemented effectively as well as how new policies and plans can be formulated based on the existing ones. Thereby, the existing policy network can be further strengthened by overcoming those barriers through the application of proposed strategies. Added to this, a far-reaching understanding could be gained by the industry practitioners on the possible challenges posed by adverse climate change impacts at this moment to identify what areas need to be considered more when taking further mitigation and adaptation actions.

## **6.6 Limitations of the study**

The study was limited to the Sri Lankan context. Further, when exploring the available climate change policies and plans, only 18 policies and plans which directly and indirectly focus on climate change considerations were selected. However, similar contexts exist in a lot of South Asian and South East Asian countries and other developing countries. Hence this case study results can be contextualised and generalised into other similar contexts.

## **6.7 Further research directions**

The following future research directions were proposed to extend the research further.

- Extend the research to explore the way of applying the proposed strategies at different levels to overcome the barriers to formulate and implement climate change policies and plans
- Critically analyse the whole climate change policy network in Sri Lanka by relating the identified barriers with them
- Assess the way of addressing the prevailing and expected climate change challenges through the available climate change policies and plans in Sri Lanka
- Investigate the role of the stakeholders of climate change policy formulation and implementation processes in strengthening the formulation and implementation of those policies and plans

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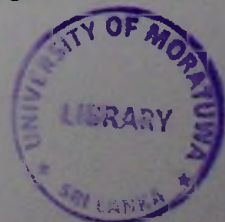
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## ANNEXURE I: KEY HIGHLIGHTS OF THE REVIEWED DOCUMENTS

| Source | Published by                                                                   | Key Highlights                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D-D1   | Ministry of Environment                                                        | <ul style="list-style-type: none"> <li>• It is mainly based on the principles contains in United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol (KP).</li> <li>• This policy has been developed to provide guidance and directions for all the stakeholders to address the extreme impacts of climate change facing Sri Lanka efficiently and effectively.</li> <li>• It focuses making communities aware of the country's vulnerability to adverse climate change impacts, taking adaptation measures to avoid/ minimise impacts on livelihoods and ecosystems and to mainstream climate change considerations into the national development plans.</li> <li>• It includes a set of guiding principles and twenty-five policy statements under the areas of Vulnerability, Adaptation, Mitigation, Sustainable Consumption and Production, Knowledge Management and General Statements.</li> </ul> |
| D-D2   | Climate Change Secretariat, Ministry of Environment and Asian Development Bank | <ul style="list-style-type: none"> <li>• It was developed for the period of 2011 – 2016.</li> <li>• It provides a prioritised framework of action and investment to move Sri Lanka and its people towards a climate resilient future.</li> <li>• It was structured under 05 main strategic thrusts. <ul style="list-style-type: none"> <li>- Mainstream Climate Change Adaptation into National Planning and Development</li> <li>- Enable Climate Resilient and Healthy Human Settlements</li> <li>- Minimize Climate Change Impacts on Food Security</li> <li>- Improve Climate Resilience of Key Economic Drivers</li> <li>- Safeguard Natural Resources and Biodiversity from Climate Change Impacts</li> </ul> </li> <li>• Under each area, thematic areas for action and relevant adaptation measures were included in a detailed manner.</li> </ul>                                                                          |

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| D-D3 | Climate Change Secretariat, Ministry of Environment | <ul style="list-style-type: none"> <li>• It was published for the period of 2016 – 2025.</li> <li>• It can be identified as one of the commitments of Sri Lanka to achieve the ultimate objective of the UNFCCC and the Paris Agreement.</li> <li>• It covers adaptation needs at two levels as adaptation needs of key vulnerable sectors and cross-cutting national needs of adaptation.</li> <li>• Under adaptation needs of key vulnerable sectors, 09 vulnerable sectors were identified namely food security, water, coastal sector, health, human settlements, biodiversity, tourism and recreation, export development and industry- energy-transportation. Broader stakeholder participation was adopted in the consultative process to investigate the adaptation needs of each vulnerable sector. In order to fulfill these needs, adaptation options and relevant actions to be implemented to achieve those adaptation options were identified with the responsible agencies and KPIs in this document.</li> <li>• Under cross-cutting national needs of adaptation, required interventions to fulfill the common sectoral needs and opinions of key stakeholders were identified.</li> </ul> |
| D-D4 | Climate Change Secretariat, Ministry of Environment | <ul style="list-style-type: none"> <li>• Being a party to the Paris Agreement, Sri Lanka presents the recently updated NDCs to UNFCCC through this document.</li> <li>• It was revised by Climate Change Secretariat, Ministry of Environment in 2020.</li> <li>• In this updated document, an enhanced ambition of 4% unconditional and 10.5% conditional emission reduction commitments of the country is presented. It is structured in a way that discusses more ambitious, quantified, and robust assessment of Sri Lanka's climate change mitigation commitments, adaptation needs, loss and damage, and means of implementation in sector-wise.</li> <li>• Firstly, NDCs of climate change mitigation targets were provided under 06 main sectors namely electricity (power; electricity generation and end-use), transport, industry, waste, forestry, agriculture (including livestock). Secondly, the adaptation NDCs were provided for the most vulnerable sectors that are agriculture, fisheries, livestock, water, biodiversity, coastal and marine, health, urban planning and human</li> </ul>                                                                                             |

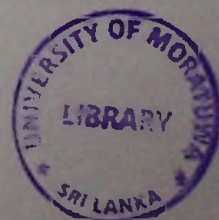
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|      |                                                     | <p>settlements and tourism and recreation. Thirdly, NDCs for loss and damage sector were provided. Also, the alignment of the proposed NDCs and respective actions with SDG framework was reviewed in this revised document. Fourthly, means of implementation were provided in terms of finance, technology transfer and capacity building.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| D-D5 | Climate Change Secretariat, Ministry of Environment | <ul style="list-style-type: none"> <li>• It was published targeting climate change mitigation component.</li> <li>• It mainly focused to identify and asses the environmentally sound technologies that can be used to reduce the extreme impact of climate change and the rate of GHG emissions in Sri Lanka within the national development process.</li> <li>• In this document, 03 main sectors namely Energy, Transport and Industry were identified as the priority sectors for mitigation which are the sectors with high GHG emission reduction potentials. The most preferred, and prioritised technologies for each sector were determined by compiling potential inventory of technologies for each sector and prioritising them through cost-benefit analysis with the involvement of relevant sectoral stakeholders. Under each sector, GHG emission mitigation targets, mitigation options, existing policies and laws related to the sector, current status of technologies, overview of potential technologies for prioritisation, mitigation benefits of the technologies identified, barriers in prioritised technologies and action plans for prioritised technologies were discussed.</li> </ul> |
| D-D6 | Climate Change Secretariat, Ministry of Environment | <ul style="list-style-type: none"> <li>• It was published targeting climate change adaptation component.</li> <li>• This document focused to identify and asses the most suited adaptation technologies to address the extreme impacts of climate change in different sectors in Sri Lanka. In here, as the priority sectors for adaptation, Food, Health, Water, Coastal and Biodiversity were identified. For each sector, the most preferred adaptation technologies were identified and prioritised, barriers in prioritised technologies and enabling framework for overcoming the barriers were presented.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| D-D7 | Climate Change Secretariat,                         | <ul style="list-style-type: none"> <li>• It represents a component of the National Climate Change Policy of Sri Lanka.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|      | Ministry of Environment | <ul style="list-style-type: none"> <li>• It was introduced under the Kyoto Protocol to UNFCCC allowing the developing countries to benefit by executing different GHG emission reduction projects within those countries.</li> <li>• The main objectives of this policy focuses on encouraging Sri Lankan public/ private institutions to involve in CDM project activities, promoting appropriate technologies that will contribute to reduce GHG emissions, enhancing national capacity in this regard and ensuring that these CDM projects contribute to accomplish the national goals of sustainable development.</li> <li>• The Sri Lanka Carbon Fund Ltd. (SLCF) was established to encourage CDM project developments by providing financial and technical assistance to prospective CDM projects. In this policy document, the proposed action plan for SLCF is also included with its objectives, relevant activities under each objective and revenue source. Further, details of different CDM projects implemented in Sri Lanka, their current status and their benefits were comprehensively included.</li> </ul> |
| I-D1 | Ministry of Environment | <ul style="list-style-type: none"> <li>• This was enacted for the period of 2009 – 2016.</li> <li>• It includes short, medium and long-term targets to address the prevailing and emerging economic and environmental challenges. They were presented under 10 main missions/ thrusts namely Clean Air - Everywhere, Saving the Fauna, Flora and Ecosystems, Meeting the Challenges of Climate Change, Wise Use of the Coastal Belt and the Sea Around, Responsible Use of the Land Resources, Doing Away with the Dumps, Water for All and Always, Green Cities for Health and Prosperity, Greening the Industries, Knowledge for Right Choices. The 3rd mission directly focused on addressing the challenges of climate change while other missions are also relating to climate change adaptation and mitigation in several aspects. Under each mission, strategies and relevant actions to be performed with its KPIs, targets and responsible agencies were presented.</li> </ul>                                                                                                                                        |
| I-D2 | Ministry of Environment | <ul style="list-style-type: none"> <li>• It provides guidance and directions to which steps that need to be taken to conserve and manage the environment in all its aspects for the benefit of present</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

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|      |                         | <p>and future generations. The aim of this policy is to ensure sound environmental management within the framework of sustainable development in Sri Lanka. The outcomes that need to be achieved through this policy have discussed in relation to the four basic natural resources as land, water, atmosphere and biological diversity. Also, environmental strategies that need to be adopted were identified under 06 main clusters namely Forestry and Wildlife Conservation, Agriculture, Plantations, Land development and Mining, Fisheries, and Coastal and Marine Area Management, Industry and Tourism, Energy and Transport and Health, Sanitation and Urban Development.</p>                                                                                                                               |
| I-D3 | Ministry of Agriculture | <ul style="list-style-type: none"> <li>• It aims to promote agricultural production through implementing technically sound, economically viable, environmental friendly and socially acceptable implementations with effective resource utilisation, enhancing local food supply, employment opportunities, and agricultural exports, enhancing productivity of water and land, and promoting good agricultural practices. There are many policy statements in this policy and under each policy statement, the required actions were listed.</li> <li>• Climate change considerations were indirectly focused through this policy where many policy statements indirectly relates to the climate change adaptation and mitigation such as irrigation and water management, land use, and soil conservation.</li> </ul> |
| I-D4 | Ministry of Environment | <ul style="list-style-type: none"> <li>• It aimed to identify country level priorities and needs for capacity building in order to deal with environmental issues, especially biological diversity, climate change, and land degradation. Climate change considerations were included as a part of this action plan.</li> <li>• Under thematic assessment of climate change towards capacity development, institutional framework, country's progress towards meeting the national obligations in this direction, the relevant policies, plans and legislations, capacity needs/ interventions at systemic, institutional and individual levels under 12 convention requirements.</li> </ul>                                                                                                                            |

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| I-D5 | National Council<br>for Disaster<br>Management | <ul style="list-style-type: none"> <li>• The main priority was given for the areas of Mitigation/Prevention, Preparedness, Response, Recovery and Sustainable Development through this policy as the main elements of Disaster Risk Management (DRM). Strategies that need to be implemented total DRM and all the relevant stakeholders were discussed in this document.</li> <li>• Climate change considerations were not directly focused through this policy where it was indirectly focused by investigating the way of managing the risk of disasters that can arise due to climate change.</li> </ul>                                                                                                                                                                                                                                                                                                                               |
| I-D6 | Ministry of<br>Environment                     | <ul style="list-style-type: none"> <li>• This policy was formulated for the period of 2015-2024.</li> <li>• It elaborates the land degradation status of the country in detail and land degradation issues of all sectors ensuring sustainable land management in the country. Accordingly, it presents the actions to be implemented with their cost estimates for combatting land degradation and overcoming effects of droughts in Sri Lanka during the said period of time.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| I-D7 | Ministry of Housing<br>and Construction        | <ul style="list-style-type: none"> <li>• This policy was enacted in 2014 and revised in 2017.</li> <li>• It mainly targeted a well-functioning housing sector that fulfills the housing needs of all citizens. In the revised version, emerging issues such as urbanization, impact of climate change and natural disasters and implementation of the concept of sustainable human settlements development have been more focused. So that, it describes that a well-functioning housing sector needs to response for the needs of all segments of population enabling them to be satisfactorily housed at affordable levels, to become productive and efficient with best outcomes, to become environmentally sound without any damage to natural resources and to response to the impact of climate change and natural disasters. Accordingly, climate change considerations were included in this policy as a separate part.</li> </ul> |

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| I-D8  | Biodiversity Secretariat              | <ul style="list-style-type: none"> <li>• This was published for the period of 2016-2022.</li> <li>• The main focus of this action plan is to provide a strategic approach in order to conserve and sustainably use the biodiversity of the country in an equitable manner. Strategic objectives for biodiversity conservation, targets under each objective, and actions to be implemented to achieve those targets were presented in this document. The impact of climate change towards the biodiversity was discussed separately in this action plan and climate change matters were taken into consideration when developing the objectives, targets and respective actions.</li> </ul>                                                                                                                                                                                                  |
| I-D9  | World Bank Group                      | <ul style="list-style-type: none"> <li>• It was prepared for the period of 2017 – 2020.</li> <li>• It aimed to assist in achievement of some of the government's medium term goals of reducing extreme poverty and promoting shared prosperity. Within the proposed WBG country partnership framework, lessons learned from Country Planning Strategy implementation for the period of 2013 – 2016 were discussed. Also, objectives for the proposed framework, key development challenges and government priorities for each objective and different aspects of the way of implementing the proposed framework were discussed. During the discussion, climate change matters were considered comprehensively in relevant manner.</li> </ul>                                                                                                                                                 |
| I-D10 | National Physical Planning Department | <ul style="list-style-type: none"> <li>• It provides a broad framework to promote the integrated planning of economic, social, environment and physical aspects of land in Sri Lanka to secure the country's place in the global economy. It further assist in bringing the government, stakeholders and communities together to make decisions to direct the future of Sri Lanka's economy, communities and environment. Key objectives were developed under 06 main headings where relevant principles and strategies were included under each and every objective to accomplish the aim of this policy. Among the 06 main headings, climate change considerations have been included under the heading of "reducing vulnerability to natural disasters". When developing the respective principles and strategies, climate change matters have been taken into considerations.</li> </ul> |



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| I-D11 | Central Bank of Sri Lanka | <ul style="list-style-type: none"> <li>It provided plans to enhance the sustainable finance in Sri Lanka which can helps the financial institutions to manage environmental, social and governance risks in the projects in an effective manner with the aim of becoming them greener, climate-friendly and socially inclusive. Among the 3 main objectives of the strategy, one is focusing on facilitating climate finance required for Sri Lanka to achieve SDGs. Accordingly, key actions were proposed in this regard by taking climate matters into consideration.</li> </ul> |
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## ANNEXURE II: SEMI-STRUCTURED INTERVIEW GUIDELINE

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Dear Sir/ Madam,

### **Data collection for MSc (by Research) Degree**

I am a postgraduate student of Department of Building Economic, University of Moratuwa, reading for Masters of Science (by Research) Degree Program. I am involved in a study focusing on "Enhancing Policy Implementations towards Successful Climate Change Mitigation and Adaptation in Sri Lanka". For that, I am expecting to gather the opinions of professionals and academics of multidisciplinary stance.

The interview questions are based on your knowledge and experience on climate change and its policy perspective in Sri Lanka. The confidentiality of the organisations as well as the participants will be maintained throughout the research and the collected information will be used for the sole purpose of this study.

I would be highly grateful if you could contribute in this research with your knowledge and experience. The interview guideline is attached herewith for your reference.

Thank you in advance.

Yours sincerely,

S. P. M. Dasandara,

Department of Building Economics,

University of Moratuwa.

**Research Aim:** To contribute towards enhancing the policy formulations and implementations towards climate change mitigation and adaptation in Sri Lanka.

**Research Objectives:**

1. To identify the challenges posed by climate change impacts globally and with reference to Sri Lanka
2. To investigate the available policies to fuel the climate change mitigation and adaptation in Sri Lanka
3. To investigate the barriers and their root causes in formulating and implementing climate change policies in Sri Lanka
4. To determine the strategies to overcome the barriers to enhance the climate change mitigation and adaptation in Sri Lanka

**Interview Guideline**

**Section A: Background Information**

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- Name of the respondent (Optional): .....
- Designation: .....
- Work experience (No. of years): .....

**Section B: Climate Change Challenges in Sri Lanka**

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1. In your opinion, what are the adverse impacts of climate change in Sri Lanka today?  
.....  
.....
2. What are the main challenges that the country is currently experiencing due to the above-mentioned climate change impacts? Please indicate them under the below categories.  
Economic challenges: .....  
Social challenges: .....  
Environmental challenges: .....

Other (If any): .....

3. What can be the future challenges due to the adverse climate change impacts in Sri Lanka?

.....  
.....

*Climate change mitigation refers to human intervention to prevent and reduce the proximate causes for climate change directly or indirectly to limit the extent of climate change.*

4. What is your opinion on climate change mitigation as a way of dealing with climate change challenges in Sri Lanka?

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.....

*Climate change adaptation refers to making adjustments by social, economic, and ecological systems to reduce their vulnerability for the prevailing and expected climate change challenges.*

5. What is your opinion on climate change adaptation as a way of dealing with climate change challenges in Sri Lanka?

.....  
.....

### Section C: Climate Change Policies available in Sri Lanka

6. What are the policies and plans, that have been implemented in Sri Lanka for climate change mitigation and adaptation? Please state your answer by filling the below table.

| Policy/ Plan                                              | Are you aware of it? |    | Description |
|-----------------------------------------------------------|----------------------|----|-------------|
|                                                           | Yes                  | No |             |
| National Climate Change Policy                            |                      |    |             |
| National Climate Change Adaptation Strategy for Sri Lanka |                      |    |             |

|                                                                                                                                                          |  |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| National Adaptation Plan                                                                                                                                 |  |  |  |
| National Action Plan for Haritha Lanka Programme                                                                                                         |  |  |  |
| Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation                                                                    |  |  |  |
| Clean Development Mechanism (CDM) Policy                                                                                                                 |  |  |  |
| Nationally Determined Contributions (NDCs)                                                                                                               |  |  |  |
| Capacity Assessment and Action Plan for Developing Capacity for Compliance with Global Conventions on Biodiversity, Climate Change, and Land Degradation |  |  |  |
| National Environmental Policy                                                                                                                            |  |  |  |
| Sri Lanka National Agriculture Policy                                                                                                                    |  |  |  |
| National Policy for Disaster Management                                                                                                                  |  |  |  |
| National Housing Policy                                                                                                                                  |  |  |  |
| National Action Program for Combating the Land Degradation of Sri Lanka                                                                                  |  |  |  |
| Other (Please specify)<br>.....<br>.....                                                                                                                 |  |  |  |

7. Are there any proposed policies and plans with regard to climate change mitigation and adaptation? What are they?

.....  
.....

8. Who are the parties involved in implementing climate change policies and plans? What are their contributions in that process?

.....  
.....



**Section D: Barriers in formulating and implementing climate change policies in Sri Lanka**

9. Based on your awareness regarding the climate change policies and plans identified above, what are the specific barriers to formulate and implement them in Sri Lanka?

| Policy/ Plan                                                                                                                                             | Barriers |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| National Climate Change Policy                                                                                                                           |          |
| National Climate Change Adaptation Strategy for Sri Lanka                                                                                                |          |
| National Adaptation Plan                                                                                                                                 |          |
| National Action Plan for Haritha Lanka Programme                                                                                                         |          |
| Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation                                                                    |          |
| Clean Development Mechanism (CDM) Policy                                                                                                                 |          |
| Nationally Determined Contributions (NDCs)                                                                                                               |          |
| Capacity Assessment and Action Plan for Developing Capacity for Compliance with Global Conventions on Biodiversity, Climate Change, and Land Degradation |          |
| National Environmental Policy                                                                                                                            |          |
| Sri Lanka National Agriculture Policy                                                                                                                    |          |
| National Policy for Disaster Management                                                                                                                  |          |
| National Energy Policy & Strategies of Sri Lanka                                                                                                         |          |
| National Housing Policy                                                                                                                                  |          |
| National Action Program for Combating the Land Degradation of Sri Lanka                                                                                  |          |
| Other (Please specify)<br>.....<br>.....                                                                                                                 |          |

10. In your view, has the current situation of the country due to Covid-19 pandemic impacted for formulating and implementing climate change policies and plans? If yes, in which ways has it being impacted?

.....  
.....

**Section E: Strategies to overcome the barriers of climate change policy implementations**

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11. What are the strategies that can be practiced within the country to overcome the barriers in climate change policy implementations? Please indicate them according to the identified barriers.

.....  
.....

***My sincere thanks to you for sharing your valuable thoughts and time***



## ANNEXURE III: INTERVIEW TRANSCRIPT

### Section A: Background Information

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- Name of the respondent (Optional):
- Designation: *Climate Finance Advisor, Commonwealth Secretariat*
- Work experience (No. of years): *17 years*

### Section B: Climate Change Challenges in Sri Lanka

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12. In your opinion, what are the adverse impacts of climate change in Sri Lanka today?

*There is different and very broad spectrum of adverse impacts of climate change in Sri Lanka. If those were taken categorically, there are direct as well as indirect impacts. One of the main direct impacts is the changes in rainfall patterns. The rainfall patterns within the country have been changed largely today than past. Another one is increase of temperature levels. It is also happening today leading to many bad impacts. Increased frequency and intensity of extreme weather events can be seen today due to these changes. For example, extreme rainfalls can lead to severe flood events and landslides. Increased temperature levels can lead to prolonged droughts. Sea level rise is also happening today in Sri Lanka. It is very slowly happening but the impacts are coming little drastically.*

13. What are the main challenges that the country is currently experiencing due to the above-mentioned climate change impacts? Please indicate them under the below categories.

*Economic challenges: There are challenges both at the micro economic level as well as macro-economic level. When considering microeconomic level, mainly reduction of yield can happen in agriculture sector. Also, disasters might damage the crops. For example, when there is a flood, most of the crops can be damaged and the yield will be reduced. Sometimes the crop quality goes down due to the changes in climate. So, the impact on agriculture sector can be seen as one of the main economic issue. When it comes to macroeconomic level, Sri Lanka's economy has drastically impacted by climate change. The food chain of the country has been*

*impacted due to the breakdown of the agricultural activities. The droughts have created lot of implications on our energy consumption and energy production. We need to import lot of coal and oil because of that. Government's budget for responding to disasters is also increasing. They need to give subsidies during the disasters, they have to pay for peoples' health issues, tax income is going down from different sectors due to these climate issues.*

*Social challenges: It links to the economic challenges. People who are dealing with different climate sensitive sectors directly affected by climate change. Their livelihoods can be impacted largely. Agriculture is the very obvious example. Farmers may highly affected due to climate change. People are socially disturbed when their livelihoods and their usual living patterns has become a challenge. So, the psychosocial challenges are very obvious among the people. People lose their livelihoods and they are forced to find other options as their livelihoods which might leading to temporary or permanent migrations/ displacements. These social challenges are much harder for marginalised communities including women. Also, there are poor or more suffered people due to climate change. That means, the poverty within the country can be increased. There are lot of health issues as well due to climate change. Mainly, a number of deaths are reported due to floods, landslides, droughts etc. in different areas of the country. Different diseases are spread among the people.*

*Environmental challenges: We have trends of increasing temperature. So, the thermal comfort of the environment is going down. Difference between minimum and maximum temperature closing up. Also, the impacts on biodiversity can happen. Different species and their life patterns can be totally changed due to climate change. So that, the ecosystem functions can be impacted. Water resources including both surface and ground water can be impacted. The quality and quantity of water resources will be reduced. So, the drinking water availability has become a huge issue. And also, food production can be impacted.*

14. What can be the future challenges due to the adverse climate change impacts in Sri Lanka?

*Future challenges can happen based on the changes in rainfall patterns, temperature patterns. Dry zones can become drier and wet zones can become wetter. Also, challenges may occur regarding water in future and that may lead to lot of economic, social and environmental challenges. Also, climate issues may affect for how people invest on the economy as well.*

*Climate change mitigation refers to human intervention to prevent and reduce the proximate causes for climate change directly or indirectly to limit the extent of climate change.*

15. What is your opinion on climate change mitigation as a way of dealing with climate change challenges in Sri Lanka?

*Mitigation is must. The root cause for climate change is GHG emissions to the atmosphere and definitely we have to settle down it. Unfortunately, it is somewhat difficult to do it in our life styles. But for the betterment of the future generation, we must go for mitigation. It is basically moving away from the fossil fuels reinstall old and conventional land use patterns on the earth. Sri Lanka's overall emission is quiet low compared to other countries. (contribution to overall GHG emission is very insignificant) Thus, we should not take mitigation as a priority. Although that argument is true, if we look at the other aspects, (environmental, economic, social) mitigation brings certain benefits to Sri Lanka as a country which is highly vulnerable for climate change.*

*We expend lot of our resources for importing fossil fuels since we don't have fossil fuel. Sri Lanka has very good renewable energy, although we are using fossil fuels. Actually, we are a pioneer nation who can use renewable energy (eg, hydropower in electricity energy). But rather that past, currently we are moving out of that. Our forestry coverage has gone down. Our land use patterns are very adhoc and we are doing lot of land clearing for development and other purposes. So, we have not done a really good job in terms of mitigation.*

*Climate change adaptation refers to making adjustments by social, economic, and ecological systems to reduce their vulnerability for the prevailing and expected climate change challenges.*

16. What is your opinion on climate change adaptation as a way of dealing with climate change challenges in Sri Lanka?

*It is not an option anymore. We must do it. The usual climate patterns are changing and we can't reverse that to the original level. So, we need to adjust it. It is a new normal. So, under that adaptation, we need to change agriculture systems, production systems, consumption systems and even the socio-economic processes. People are voluntarily or involuntarily moving towards adaptation. The farmers are moving towards mix agricultural crops rather than the mono crops knowing that there are many impacts due to climate change. In the past, they cultivated rice to get the yield within 3 or 6 months, but today they cultivate ultrashort crops to get the yield within 2.5 months that using long term varieties because they know the risk of it. In the construction, we are more concern about floods and droughts. So, these are adaptation and it is happening now. These are some short-term ones and we need to have some mega scale adaptation as well (i.e. to transfer water between wet zones and dry zones we can have some engineering infrastructures).*

### Section C: Climate Change Policies available in Sri Lanka

17. What are the policies and plans, that have been implemented in Sri Lanka for climate change mitigation and adaptation? Please state your answer by filling the below table.

| Policy/ Plan                   | Are you aware of it? |    | Description                                                                                                                               |
|--------------------------------|----------------------|----|-------------------------------------------------------------------------------------------------------------------------------------------|
|                                | Yes                  | No |                                                                                                                                           |
| National Climate Change Policy | √                    |    | <i>It gives an overarching policy. It mainly based on the UNFCCC. All the things covered under UNFCCC is mentioned under this policy.</i> |

|                                                                                                                                                          |   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| National Climate Change Adaptation Strategy for Sri Lanka                                                                                                | √ | <i>It gives some broader strategies under economic of the country. Its expired now.</i>                                                                                                                                                                                                                                                                                                                                                   |
| National Adaptation Plan                                                                                                                                 | √ | <i>It was prepared based on the National Climate Change Adaptation Strategy for Sri Lanka.</i>                                                                                                                                                                                                                                                                                                                                            |
| National Action Plan for Haritha Lanka Programme                                                                                                         | √ | <i>Long term strategy. It's not only on climate change. It is a kind of a broader environmental strategy which brings lot of core benefits in every aspect.</i>                                                                                                                                                                                                                                                                           |
| Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation                                                                    | √ | <i>Two TNA for mitigation and adaptation. Both try to assess what are the technological needs that we required to do mitigation and adaptation. It is very important to identify what are the short term local technological requirements as well as long term technological requirements in a broader manner. Also, it identifies technological transforms within the country and also among the developing and developed countries.</i> |
| Clean Development Mechanism (CDM) Policy                                                                                                                 | √ | <i>It is the response for Sri Lanka for being a party to Kyoto Protocol. Kyoto protocol brought up this market mechanism. But now the Kyoto protocol is lapsed. After 2020, it has not been extended and so CDM is also now outdated. But it is a good basis to think on whatever the future market mechanisms coming into climate change mitigation.</i>                                                                                 |
| Nationally Determined Contributions (NDCs)                                                                                                               | √ | <i>It is the latest policy framework globally. Sri Lanka is being a party to Paris agreement we must to submit our NDCs to Paris agreement board. We submitted our first NDCs in 2015. But very recently, we updated our NDCs with higher ambition level and now it has been approved. So, the updated NDCs is the most valid and prominent policy framework or the policy guidance we have towards climate change.</i>                   |
| Capacity Assessment and Action Plan for Developing Capacity for Compliance with Global Conventions on Biodiversity, Climate Change, and Land Degradation | √ | <i>This is a broader one. Now it is outdated because it was considered at very early stages of Rio conventions. But it has</i>                                                                                                                                                                                                                                                                                                            |



|                                                                         |   |   |                                                                                                                                                                                           |
|-------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                         |   |   | <i>certain valid areas which we can still consider.</i>                                                                                                                                   |
| National Environmental Policy                                           | √ |   | <i>National environment action plan was developed very recently based on this policy.</i>                                                                                                 |
| Sri Lanka National Agriculture Policy                                   | √ |   | <i>Very recently, the updated agricultural policy has been submitted. It highlights the importance of mitigation and adaptation in the agriculture sector.</i>                            |
| National Policy for Disaster Management                                 | √ |   | <i>This is very much linked with UNDRR program and Sendai framework.</i>                                                                                                                  |
| National Energy Policy & Strategies of Sri Lanka                        | √ |   | <i>It has been lapsed. The energy policy has been updated and set towards energy security and transformation to renewable energy. Climate change considerations are included as well.</i> |
| National Housing Policy                                                 |   | √ | -                                                                                                                                                                                         |
| National Action Program for Combating the Land Degradation of Sri Lanka | √ |   | <i>This has direct and indirect links with climate change priorities (especially land use, resilience, adaptation aspects).</i>                                                           |
| Other (Please specify)<br>.....<br>.....                                |   |   | -                                                                                                                                                                                         |

18. Are there any proposed policies and plans with regard to climate change mitigation and adaptation? What are they?

*Discussions are going on how the ICT policies are linked with climate change because now working remotely, 3D printing, integration of renewable energy with ICT are growing.*

19. Who are the parties involved in implementing climate change policies and plans? What are their contributions in that process?

*Overcoming climate change challenges can be done within a system and this system should include participants from all levels like national level, government level, industrial/ institutional level and community level likewise. Government is*

*the main party who involving in policy developing activities by providing a kind of leadership for the other parties involved. Different experts in different sectors from state agencies, ministries can be identified from this level. Researchers are another main party. They provide novel and innovative ideas for developing and implementing climate change policies and plans. Always they have updated knowledge on what is happening currently in the country. So, getting the support from these academic researchers, experts in whatever the relevant areas would be very much beneficial in this process since they can provide a huge contribution in developing these policies and plans. Community is another party. They are the one who actually experiencing the impacts of climate change. So we can say that community is the most vulnerable party for climate change. They know the severity of the situation properly and to which level these situations need to be controlled. So, they can also provide a better contribution for implementing these policies based on their ideas. Community level organisations can be established and the representatives from such organisations can actively involve in this process. NGOs is another important party. Such organisations always concern about environmental issues, sustainability etc. Actually, they are one of the major parties who can make an influence for the government and other parties to maintain the relevant actions. If government or other parties are not actively involving in this regard, NGOs can take actions to make an influence on them. It is very important to having such influential party otherwise the policies are just implemented but nobody follow them, no continuation of them. Another party is international level organisations. They have already implemented different country level programs. We can get knowledge, expertise, and funding supports as well from them and can apply into the Sri Lankan context.*

#### **Section D: Barriers in implementing climate change policies in Sri Lanka**

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20. Based on your awareness regarding the climate change policies and plans identified above, what are the specific barriers to implement them in Sri Lanka?

*All the barriers are common for each and every policy implementation. One of the biggest barriers is lack of awareness and understanding of the stakeholders. People and institutions think that they know about climate change because they*

have heard about it, but actually they have not gone into the deeper level in terms of implementing mitigation and adaptation. Each and every party has to play role in implementing these policies and so that all of them should properly aware about these things. So, they need to step up with knowledge and awareness levels, technical aspects etc. Another barrier is financial barriers. The targets of these policies are really ambitious and implementing actions for them need a higher level of investments. We are lacking with local investments and we should try to find the ways to get finance. Other barrier is lack of coordination. The coordination between the involved parties is very much lacking. Also, we don't have adequate technical skills. Another aspect of barriers is lack of policy coherence. There are some areas that are not converging together. Some of their targets in Biodiversity action plan are not that much tally with our economic development targets. When considering NDCs targets on land use and our industrial targets, they are not matching. This policy coherence must be set but for that we need adequate awareness and knowledge. Another one is poor data sharing and lack of common platform to access the data. We have to submit national communications under UNFCCC and we have developed an inventory for the country and for that we did an assessment of all the emissions related information from different departments. When we start the work, we had no data but when we go into the deeper, there are data but they were in different formats. Most of the available data are in different format, are not consistent and are not shared. Data is there but they are not shared. The coordination among the parties need to be there for enhancing the data sharing.

21. In your view, has the current situation of the country due to Covid-19 pandemic impacted for formulating and implementing climate change policies and plans? If yes, in which ways has it being impacted?

*Covid-19 is not something that we anticipated. Most of the plans, strategies have planned based on a normal life but now we are in a new normal. So how to adjust the implementation processes into new normal raised by the pandemic is a challenge. Still we, as a country have not 100% adjusted for the pandemic situation and we still want to get things normal. So, what is happening now is we are not implementing the plans. We are waiting for a right time to implement them. But*

*what we need to do is implementing the plans under the new condition. That is the challenge and it has not been discussed and agreed yet Still analysis have not done how the Covid-19 adjustments need to be done in line with these policy implementations.*

#### **Section E: Strategies to overcome the barriers of climate change policy implementations**

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22. What are the strategies that can be practiced within the country to overcome the barriers in climate change policy implementations? Please indicate them according to the identified barriers.

*We have to select most recently updated policy as a guideline for other policies. So, Sri Lanka needs to focus on NDCs and its implementation plan. Acquiring finance is very much important. There should be a strategy for gaining finance. People think that climate finance are adequate but if we look at the size and scale of the ambitious targets of these policies the available finance are not sufficient. So, we should have an integrated approach towards mobilising finance to implement them. What are the sources? Firstly, we have to get the government funds. Basically, we need to make sure that the government development plan is integrated with climate change considerations (mainstreaming climate change). Secondly, we need to promote policies and practices or legislations that promote local investments towards climate change. Thirdly, private sector investments need to be promoted towards climate change. At the moment, private sectors are coming up with their own investment strategies. So, what we need to do is looking at NDCs and identify where the private sector investments are viable and allow private sector to come and implement them. At the same time, internationally there are lot of supportive channels. We have specific climate funds, multilateral development banks, some other philanthropic funding. Overall there should be an integrated approach. Government, private sector, NGOs, communities all have to come to a one platform to implement them. Private sector involvement needs to be further encouraged. Currently it is significantly lacking. Awareness in this regard need to be created among private sectors. Another one is establishing proper institutional coordination. Community engagement is very valid because without active*

*community engagement these mitigation and adaptation actions might not effective. Creating awareness among the communities needs to be further improved.*

***My sincere thanks to you for sharing your valuable thoughts and time***

